

modern machine shop

**METALWORKING
IN RUSSIA**

See Page 108

**FACTS ABOUT
ULTRASONIC
MACHINING**

See Page 116

MARCH 1959



**for tool holding
and
work holding
it's always**

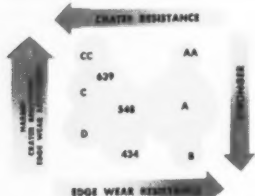
Jacobs
CHUCKS

New!

ADAMAS Grade Selection Chart

YOUR GUIDE TO PROPER GRADE SELECTION

MATERIALS		
<p>Cast Iron, Copper, Aluminum, Brass, Bronze, Magnesium, Molybdenum, Rubber, Fibre, Messing, Wood, Plastics, Zinc Alloys, Titanium and Titanium Alloys, Monel, A, Hi Hard, light cuts on 300 stainless steels.</p> <p>Any material where feed of less than .005 is being used.</p>	<p>SAE 1000, 2000, and 8000 Series</p>	<p>SAE 3000, 4000 Series</p> <p>SAE 52100, Invarloy, Monel, Inconel.</p> <p>Heavy cuts on Series 300 Stainless Steels.</p> <p>Series 400 Stainless Steels.</p>
<p>ADAMAS GRADE B, A, AA</p>	<p>ADAMAS GRADE D, C, CC</p>	<p>ADAMAS GRADE 434, 548, 639*</p>
<p>ALSO USED TO MACHINE ANY MATERIAL WHEN EDGE WEAR IS THE PRIMARY PROBLEM.</p>	<p>ALSO USED TO MACHINE ANY MATERIAL WHEN CRATERING IS THE PRIMARY PROBLEM.</p>	<p>ALSO USED TO MACHINE ANY MATERIAL WHEN BOTH EDGE WEAR & CRATERING ARE PROBLEMS.</p>



EXAMPLES

WHEN MACHINING A MATERIAL WITH GRADE A

- If excessive edge wear occurs change to Grade AA.
- If chipping occurs change to Grade B.
- If cratering is excessive change to a steel cutting grade (probably Grade C).
- If both excessive edge wear and cratering occur switch to Grade 548.

WHEN MACHINING STEEL WITH GRADE C

- If excessive edge wear occurs change to Grade CC.
- If chipping occurs change to Grade D.
- If cratering is excessive change to Grade CC.
- If both excessive edge wear and cratering occur switch to Grade 548.

WHEN MACHINING STEEL WITH GRADE 548

- If excessive edge wear occurs change to Grade 639.
- If chipping occurs change to Grade 434.
- If cratering is excessive the grade change depends upon the type of steel being machined:
 - (a) If a carbon steel — change to Grades C or CC.
 - (b) If an alloy steel — change to Grade 639.
- If both excessive edge wear and cratering occur switch to Grade 639.

HOW TO COUNTER THE EFFECTS OF...

EDGE WEAR	CRATERING	CHIPPING & BREAKAGE
<p>Use harder grade of carbide</p> <p>Reduce speed</p> <p>Increase feed</p> <p>Use coolant</p> <p>Check center height of tool — tool above center will cause rubbing</p> <p>Check hardness of material</p>	<p>Use harder and/or more crater resistant grade of carbide</p> <p>Increase speed</p> <p>Decrease feed</p> <p>Use coolant with good lubricating properties</p> <p>Use positive rake tool — increase angle to decrease chip friction against tool</p>	<p>Use stronger grade of carbide</p> <p>Use negative rakes.</p> <p>Check tool design:</p> <ul style="list-style-type: none"> (1) chip size (2) lip size (3) lead angle (4) radius (5) chipbreaker <p>Check tool preparation:</p> <ul style="list-style-type: none"> (1) brazing (2) grinding <p>Check tool application:</p> <ul style="list-style-type: none"> (1) overhang (2) tool not on center (3) amount of coolant <p>Check machine for looseness, etc.</p>

Designed to give you a practical guide to carbide grade selection and application



Shows what grades to use on a wide range of materials... stainless steels, titanium, etc.

Quick reading diagram for fast grade reference.

Valuable application data on how to counter the effects of Edge Wear, Cratering, Chipping and Breakage.



Reverse side carries complete and up-to-date Carbide Industry grade chart (Industry designations C-1 thru C-14).



ideal for shop posting or desk use... size 8" x 10", printed on heavy soil-resistant, high gloss stock.

Send for your Free copy of this chart today.

ADAMAS

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KENILWORTH, NEW JERSEY

Producers of Tungsten Carbide Tools, Tool Tips, Dies, Wear Parts and Dex-A-Tool

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Please send me a copy of the new Adamas chart titled "Your Guide To Proper Grade Selection".

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modern machine shop

Published in the
Machine Tool Capital
of the World

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Member



features in the

Assembling & Finishing...Inspecting, Testing & Control...
Press Working...Management & Safe Practices...Materials
& Processes...Production Machining...Tooling & Design

MARCH

METALWORKING AND MACHINE TOOLS IN THE USSR

By Richard E. Stockwell

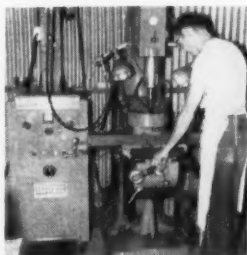
The author of the book "Soviet Air Power" describes his visit to several manufacturing plants and the Moscow Agricultural and Industrial Exhibition. The photographs which accompany the text were taken by the author.

Page 108

A LOOK AT ULTRASONIC MACHINING

By Gilbert C. Close

What is ultrasonic machining? How do ultrasonic machines operate? What sort of work do they do? How much do they cost, and will it pay the average job shop to install such equipment? To obtain the answers to these questions, the author visited a job shop where ultrasonic machining equipment was being used and secured the information first hand.



Page 116

HOW TO SOLVE YOUR SUPERVISORY PROBLEMS

By Alfred M. Cooper

In this issue's regular monthly department on solving supervisory problems, Mr. Cooper provides answers to questions pertaining to plant training programs and the need for close cooperation between training and production departments.

Page 122

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In this issue

March 1959 • VOL. 31 • NO. 10

Control...
Materials
Design

HOW TO FASTEN THIN MATERIAL WITH FLAT HEAD MACHINE SCREWS

By Fred Rogers

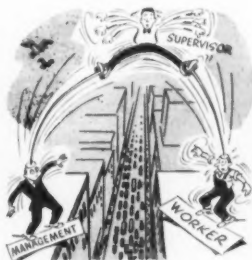
A number of effective methods for assembling thin materials or parts—graduated scales; pieces made of strip stock; belt, chain and gear guards of sheet steel; thin covers; wrought steel and brass hinges; name, legend and information plates; and so on—to machine castings and various other metal surfaces using flat head machine screws are illustrated and described in detail.

Page 124

THE SUPERVISOR AND HIS BOSS

By Alfred M. Cooper

"The industrial supervisor is an integral part of management and cannot possibly straddle the great gap that inevitably separates management and worker," points out Contributing Editor Cooper in this interesting and informative discussion of supervisor-management relations.



Page 130

MACHINING STAINLESS STEEL

By G. J. Stevens

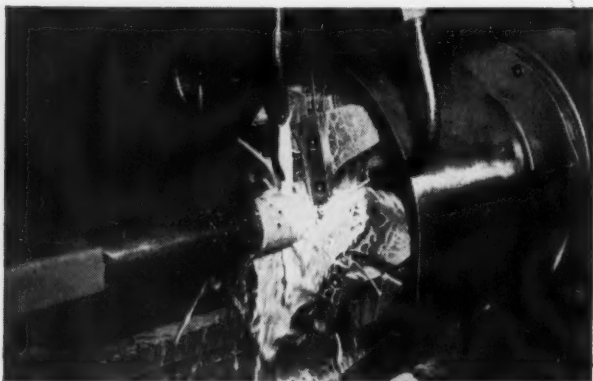
In this case history, a solution is given to the problem of poor tool life that was encountered when box-turning 1¼-inch diameter Type 304 stainless steel.

Page 146

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WHY *is chaser hardening important to your threads?*

When cutting threads—long tool life, maximum accuracy, and trouble-free operation can only be assured by proper chaser hardening. For example, LANDIS Tangential Chasers are often given special hardening treatment when work-piece design or material specifications so indicate. Just as with the blacksmith of years gone by, so chaser hardening today is an art. The ability to determine and apply the proper chaser-hardening technique is the result of our more than 50 years experience in a single field—THREADING. This is but one of the many ways in which LANDIS Threading Specialists may be of help. Whatever your need for generating threads—Cutting, Rolling, Grinding, or Tapping—LANDIS Threading Equipment will accomplish it most efficiently and economically.



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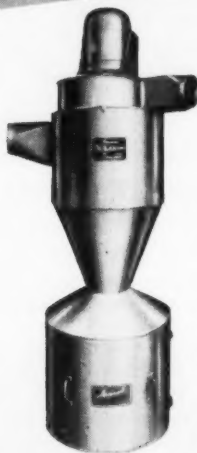
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Hammond

DUS KOLECTORS

MIST KOLECTORS



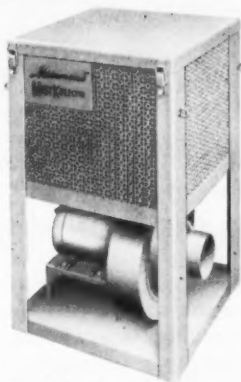
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March, 1959

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CONTROL CENTER Ease of operation is one of the principal reasons for using any hand turret lathe. The Wade "Model 94" shown here performs more quickly and more accurately than a larger, more cumbersome machine of the same type — on the same work. The Wade Control Center provides the ultimate in effortless control of all functions.

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any production speed**

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free!

get full details about the complete Spitfire line of lapping machines. Write, phone today.

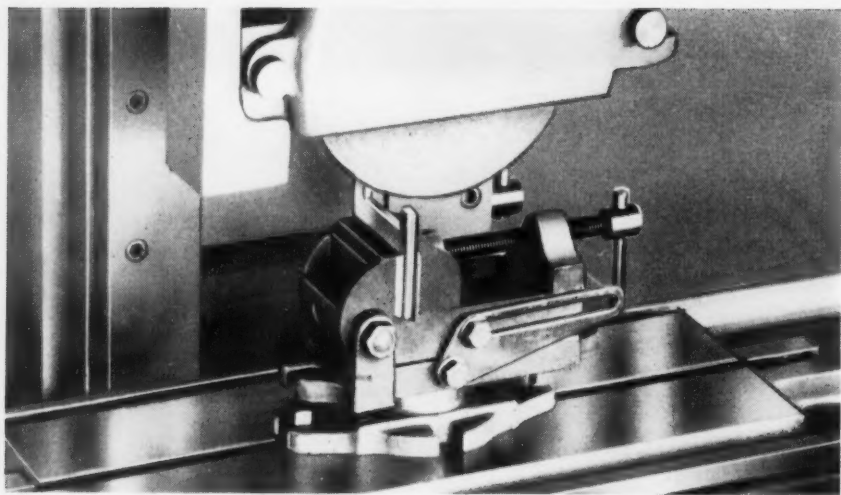
SPITFIRE TOOL AND MACHINE COMPANY

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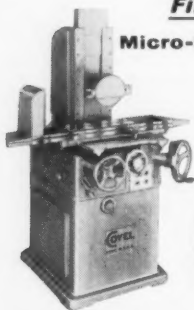


This is not an ordinary surface grinder at work...

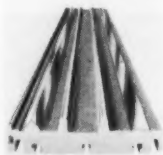
It's a Covell No. 10—built to do MICRO-PRECISION work on accurate snap gages like this. And it also does a top-notch grinding job on other tool room work such as form tools, jigs and dies—day after day and year after year to save you money. Covell pioneered with *hard chrome table ways* that keep this 6" x 18" machine in *top position* in the tool room grinder line-up far longer than grinders with ordinary ways. Covell-developed smooth *timing belt table drive*, hardened and ground lead screws and rigid vertical slide are among other outstanding features that add up to long-lived Covell MICRO-PRECISION performance.

First with hard chrome table ways...

Micro-Precision a Covell Tradition—Since 1874



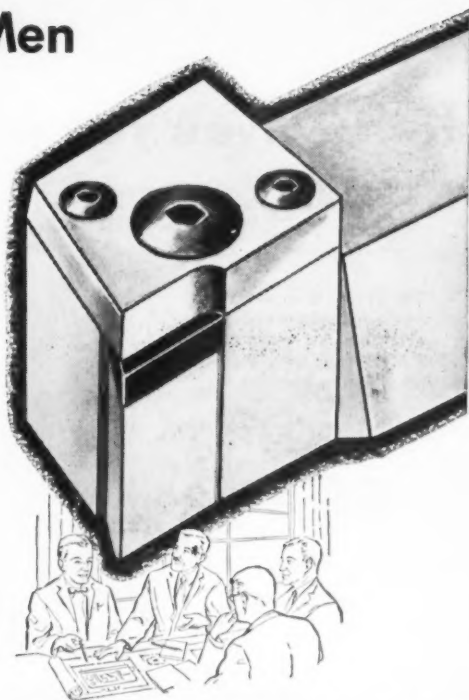
Send today for your copy of "The Covell Precision Story" and complete data on the Covell Surface Grinder that meets your needs — seven sizes from 6" x 12" to 16" x 36". Ask for Bulletin M-39



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Tools...
for Best
on-the-job
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CINCINNATI

gives you positive correction

Gage-Line unit mounted on the footstock housing of a CINCINNATI FILMATIC 14" x 36" Heavy Duty Universal Grinding Machine.



CINCINNATI®

CENTERTYPE GRINDING MACHINES • CENTERLESS
MICRO-CENTRIC GRINDING MACHINES • CHUCKING

Taper
tertyp
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G-663

GRINDING
GRINDERS

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AT GAGE-LINE UNIT

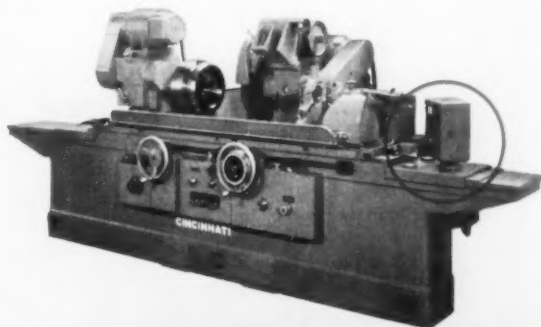
ion of taper ... quickly; accurately

Taper is an elusive factor in center-type grinding. The cut and try method of eliminating or correcting it is expensive and quite often wasteful of nearly-finished parts. Gage-Line is Cincinnati's answer to precise taper control. It is an electronic taper correcting unit which eliminates trial and error with amazing sureness and accuracy. ¶Here's the way it works. A gage head is mounted on each end of the table, and an electronic control unit is mounted on the right-hand end of the machine. When the swivel table is adjusted, the control unit

electronically translates the signal from each gage head to a graduated meter, reading direct for amount of movement and length of workpiece. ¶Gage-Line unit is another forward step by Cincinnati in their continuing efforts to improve the accuracy and reduce the cost of precision center-type grinding. Gage-Line is available for all CINCINNATI FILMATIC 4" to 14"L Plain Grinding Machines and 10" to 18" Universal Grinding Machines having between-center lengths up to 48" inclusive. Want more information? Ask for brochure G-687.



Gage-Line unit mounted on the bed of a CINCINNATI FILMATIC 18" x 48" Universal Grinding Machine. Detailed information on these fine precision grinders in catalog No. G-663-2.



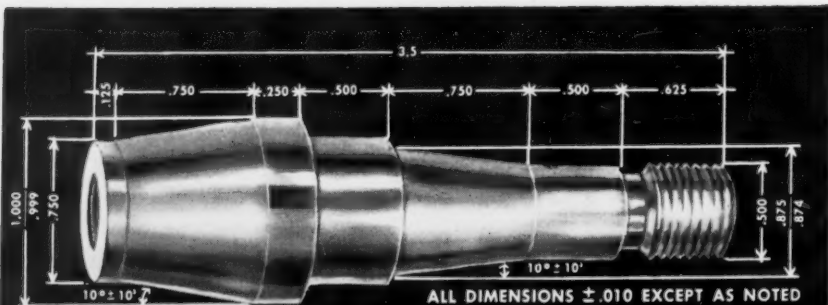
GRINDING MACHINES • ROLL GRINDING MACHINES
GRINDERS • CENTERLESS LAPPING MACHINES

GRINDING MACHINE DIVISION
The Cincinnati Milling Machine Co.
Cincinnati 9, Ohio

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152 OF THESE IN 8 HOURS?**

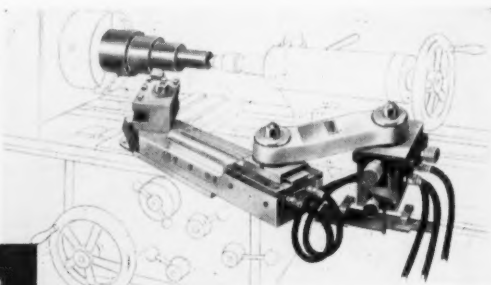
**YOU CAN WITH A "MIMIK"[®]
on your present lathe!**

Operation	Time Mins.	Operation	Time Mins.
1. Install MIMIK [®] ★	30	6. Checking §	Nil
2. Make Template	90	7. Polishing †	Nil
3. Tooling ●	Nil	8. Final Inspection ‡	30
4. Set-up £	35	9. Packaging and Shipping	45
5. Floor to Floor (Each)	90 Secs.		

Total Time, 152 pieces 6 hrs. 30 mins.

REMARKS:

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- One standard Tool Bit required.
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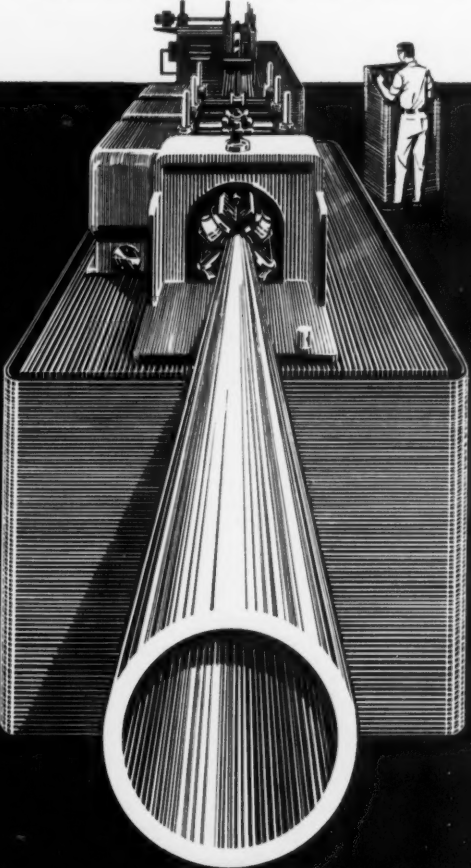
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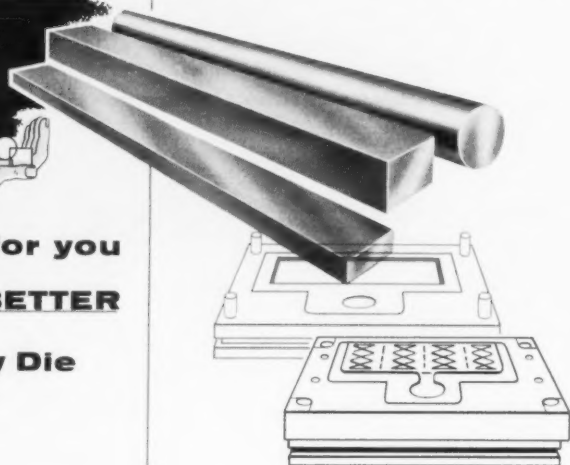


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through BETTER
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Steels**

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- * GSN FM
- * COBALT CHROME FM

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Users of Latrobe's 12% chromium die steels pave the way toward greater production economy. Why? Because, as a result of Latrobe's exclusive DESEGATIZED® process, these steels are free of harmful carbide segregations—fully-uniform to insure maximum die results. Containing evenly-dispersed alloy sulphides, they are easier to machine... easier to work!

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LATROBE STEEL COMPANY

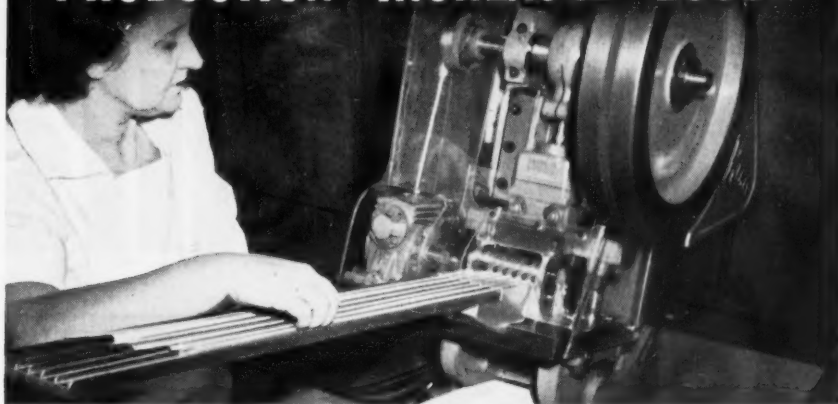
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Let Kenco Engineers help solve your problems where more profitable punch press operation is your goal. Kenco presses are made in 2, 5, 8, 12, 15, 18, 21 and 26 tons capacities, with 108 Models to select from—the largest selection of small presses available anywhere.

Job Facts:

Machine: 5 ton Kenco Punch Press with high speed roller bearings and automatic lubrication.

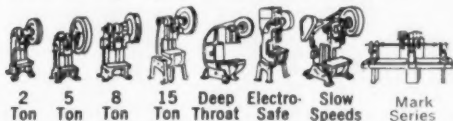
Feed: Automatic adjustable roll feed.

Stock: Rubber strip.

Production Advantage: Increased 10 times at rate of 500 spm compared to production on replaced equipment.

Maintenance: None to date.

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POWER

Electric Drills

SIoux ELECTRIC SCREWDRIVERS

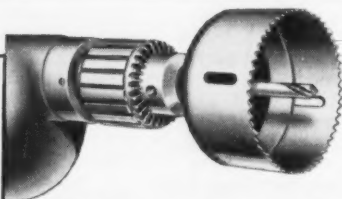
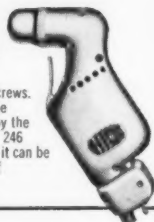
NO. 260 - 262

On No. 260 Super Screwdriver the operator controls the tightness with which a screw is set by the amount of pressure he applies. The 1/4" Hex Drive takes shanks for clutch head screwdriver bits, Reed and Prince, Standard screws, Phillips, and socket head (Allen Type). On the No. 262 Super Screwdriver tightness is pre-determined by adjusting the clutch. Both models equipped with reversing switch.



NO. 242

It fits the hand, and operates in restricted space like no other electric screwdriver. It quickly drives or removes all types of screws. No. 242 has a positive clutch; the operator controls the tightness by the amount of pressure applied. No. 246 has an adjustable clutch, so that it can be preset for any uniform degree of tightness desired.



SIoux HIGH-SPEED STEEL TEETH HOLE SAWS

will cut holes from 1/2" to 6" in diameter, in any free machining material to a depth of 1 1/4". Alloy or stainless steel may be cut at slow speed. High-Speed teeth welded to chrome-vanadium body give maximum life and cutting ability.

POWER* SPECIFICATIONS SIoux ELECTRIC DRILLS

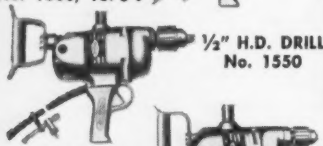
When it's a SIoux you know what it will do

Catalog Number	No Load Speed	H.P. and R.P.M. at Lead Speed	Oz. Ft. Torque at Lead Speed	H.P. and R.P.M. at Peak Load Speed	Oz. Ft. Torque Peak Load
1475	2250	5/64 1525	4.9	7/64 1050	8.8
1480	1600	7/64 1140	7.9	5/32 790	16.8
1485	1650	3/32 1060	6.9	1/8 620	16.7
1495	1650	3/32 1060	6.9	1/8 620	16.7
1498	400	3/16 275	45.0	9/32 215	108.0
1510	525	27/64 370	95.0	39/64 230	222.0
1517	925	13/32 670	49.0	9/16 540	135.0
1519	1250	13/32 860	37.5	9/16 500	96.0
1525	1650	5/16 1060	31.0	3/8 680	45.0
1541	925	13/32 670	49.0	9/16 540	85.0
1548	525	27/64 370	95.0	39/64 230	222.0
1550	525	7/16 325	108.0	17/32 175	252.0
1560	400	9/16 260	175.0	3/4 155	400.0
1575	400	3/4 205	308.0	1-1/8 125	748.0
1579	350	49/64 200	315.0	1-9/64 115	800.0
1472	1600	13/64 960	17.8	17/64 720	32.4
1473	950	13/64 575	31.6	17/64 430	55.0
1474	625	13/64 375	44.6	17/64 280	84.2
1477	950	13/64 575	31.6	17/64 430	55.0
1478	625	13/64 375	44.6	17/64 280	84.2
1479	1600	13/64 960	17.8	17/64 720	32.4

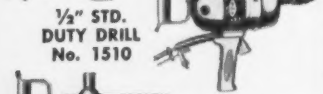


1" H.D. DRILL
No. 1579

3/8" & 3/4"
H.D. DRILLS
No. 1560, 1575



1/2" H.D. DRILL
No. 1550



1/2" STD.
DUTY DRILL
No. 1510



3/8" & 5/16"
H.D. DRILL
No. 1517, 1519

1/2" SLOW SPEED
DRILL No. 1548



*for complete specifications

SEE THE NEW SIoux CATALOG

Lea
eve
and
SIO
AUT
ANI
IN I

A

AIR IN
ELECT
FACE

when it's a **SIoux**

You know what it will do!

The Horsepower and torque for each Sioux drill is rated, stated, and certified. It isn't necessary to buy just a drill. When it's a Sioux you know what it will do. See the power specifications for Sioux Electric Drills in this advertisement.

NEW

Super Powered **1/4" and 3/8" DRILLS!**

Here is super power to provide all the torque necessary for any operation where this type of drill would normally be used. (See specifications) And there's a speed for every need. It's an entirely new design in which the brushes have been located at the fan position at front of the drill. The advantages include cooler running, and easier inspection and replacement of motor brushes without partial or complete disassembly of the tool. Ball and roller bearing construction, with finest precision gears and mechanical design have achieved a new high in output efficiency.



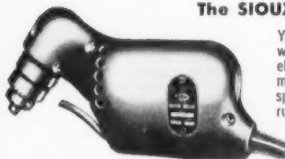
1/4" No. 1472,
1473, 1474



3/8" No. 1477,
1478, 1479

All time sales champ

The **SIoux No. 1495 1/4" ALL ANGLE DRILL**



Year after year this is a top seller in the SIoux line. It's popular with almost everyone—auto mechanic, sheet metal worker, electrician, shipbuilder, woodworker, assembly line, factory maintenance man. It fits the hand and operates in restricted space like no other tool. It's a most convenient handful of rugged power.



Leading distributors everywhere display and sell Certified **SIoux** power drills.

AUTHORIZED SERVICE AND DISTRIBUTORS IN PRINCIPAL CITIES



ALBERTSON & CO., INC.

SIoux CITY, IOWA, U. S. A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • VALVE FACE GRINDING MACHINES • SCREWDRIVERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS

For more data circle 318 on Postpaid Card



3/8" H.D. DRILL
No. 1541

1/4" H.D. DRILL
No. 1525
BALL BEARING



1/4" H.D. DRILL
No. 1480 SEMI
BALL BEARING

1/2" LT.
DUTY DRILL
No. 1498



1/4" DRILL
No. 1485



1/4" DRILL
No. 1475

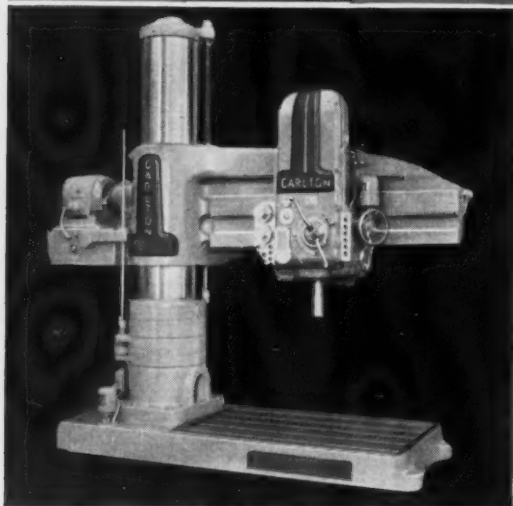
Model	Column diameters	Arm lengths	Speeds		Feeds		Motor recommended
			No.	Range	No.	Range	
0A	9"	3'-4'	9	20 to 1	4	.006-.020	3-hp
1A	9" 11"	3'-4' 3'-4'-5'	12	25 to 1	6	.006-.025	5-hp 5 or 7½-hp
3A	13" 15" 17"	4'-5' 4'-5'-6" 5'-6'-7"	36	100 to 1	18	.004-.125*	7½, 10, 15, 20 or 25-hp
4A	19"	6'-7'-8'	36	100 to 1	18	.004-.125*	15 to 40-hp
5A	22" 26"	7' to 10' 8' to 12'	36	100 to 1	18	.004-.125*	20 to 40-hp†

*8, 11½, 14 and 18 threads per inch are standard, with various other combinations available.

†Driving motor larger than 40 hp can be used if desired.

Carlton...the modern design radial drill

0A 1A 3A 4A 5A



Carlton, the modern design radial drill, is the *only* radial drill to bring you all these advantages:

- Low-hung drive to spindle
- All ball bearing construction
- Independent electric power for spindle and all auxiliary components
- Pushbutton control
- 3-unit power clamping
- Precision column clamping

In addition to providing the most modern design, Carlton also offers the widest choice:

- 5 different models
- Column diameters from 9" to 26"; arm lengths from 3-ft. to 12-ft.
- 5 different types of speed-feed controls (on 3A, 4A and 5A models)

Write today for descriptive bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Carlton *Specialists in radial drills*

For more data circle 319 on Postpaid Card

Only from

W-T
ALKER-TURNER . . .

FULL 6" SPINDLE TRAVEL IN A LOW-COST 15" DRILL PRESS

Here's the biggest value in drill presses on the market—a rugged Walker-Turner "Light-Heavyweight" that offers big capacity formerly found only in larger, higher priced units. With one pass of the drill, it will machine holes in cast iron up to 6" deep and in diameters up to $\frac{1}{2}$ ". In addition, it's capable of providing fast, accurate production drilling for years to come. Available in bench and floor single or multiple spindle production models.

For a demonstration, see your W-T Distributor (listed under "Tools" in your yellow pages).

The Walker-Turner drill press line includes 15"—4 $\frac{1}{4}$ " travel, 17"—5" travel, 20"—6" travel, and radial drill presses.

FREE CATALOG!

Write to Walker-Turner Division, Rockwell Manufacturing Co., Dept. WC-22, 400 N. Lexington Ave., Pittsburgh 8, Pa.



15" Production Model



For more data circle 320 on Postpaid Card



Never Confuse the No. 8 MARVEL with an ordinary Band Saw ...only the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a 1/4" rod or cut-off an 18" x 18" cross section.



Rough to Size and Shape



Miter



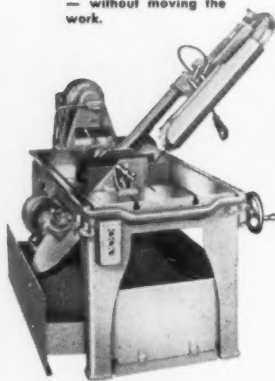
Index



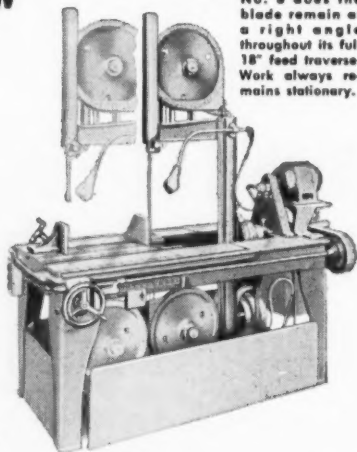
cut off and shape
Structural Beams



Slotting



Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimum chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

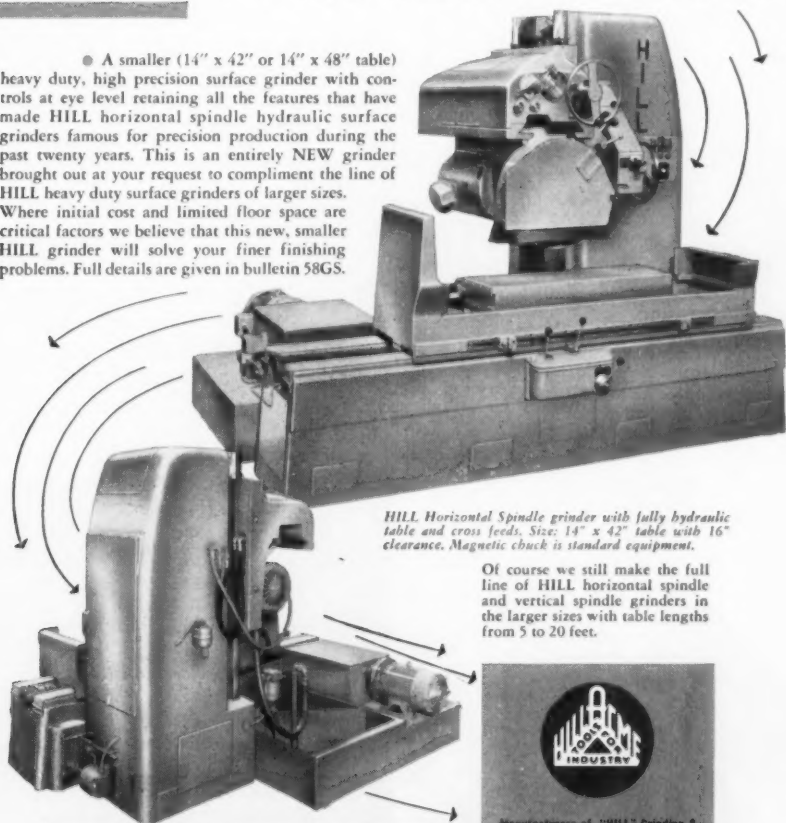


ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

For more data circle 321 on Postpaid Card

HERE IS THE GRINDER YOU ASKED FOR!

● A smaller (14" x 42" or 14" x 48" table) heavy duty, high precision surface grinder with controls at eye level retaining all the features that have made HILL horizontal spindle hydraulic surface grinders famous for precision production during the past twenty years. This is an entirely NEW grinder brought out at your request to compliment the line of HILL heavy duty surface grinders of larger sizes. Where initial cost and limited floor space are critical factors we believe that this new, smaller HILL grinder will solve your finer finishing problems. Full details are given in bulletin 58GS.



HILL Horizontal Spindle grinder with fully hydraulic table and cross feeds. Size: 14" x 42" table with 16" clearance. Magnetic chuck is standard equipment.

Of course we still make the full line of HILL horizontal spindle and vertical spindle grinders in the larger sizes with table lengths from 5 to 20 feet.

THE HILL ACME COMPANY

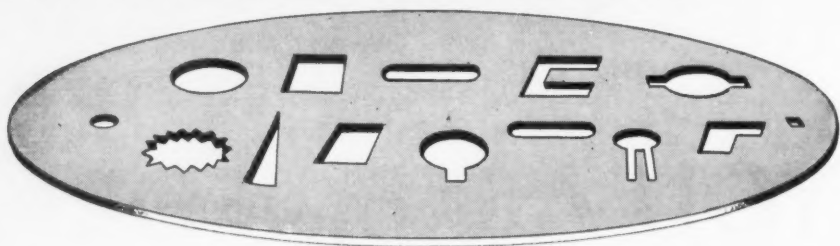
1207 W. 65th STREET
CLEVELAND 2, OHIO

For more data circle 322 on Postpaid Card



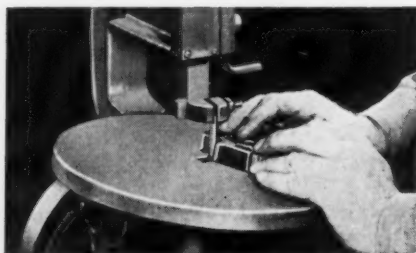
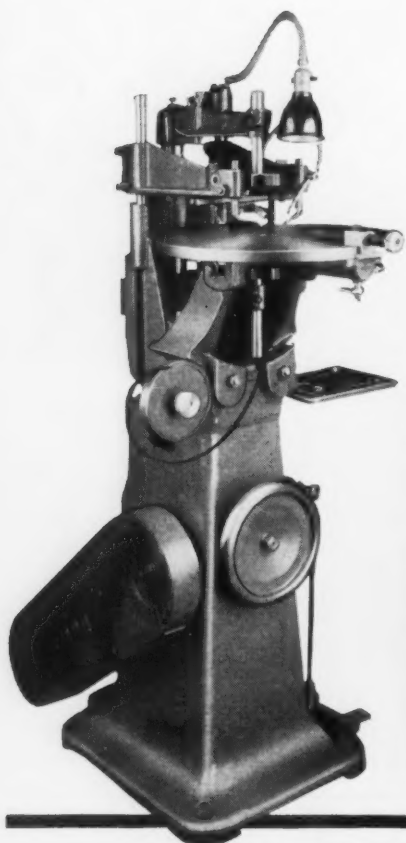
Manufacturers of: "HILL" Grinding & Polishing Machines — Hydraulic Surface Grinders — "ACME" Forging — Threading — Tapping Machines — "CANTON" Alligator Shears — Billes? Shears — "CLEVELAND" Rebars — Shear Blades

FOR CONTOURS LIKE THESE . . .



Freak contours — more conventional shapes — internal or external forms. In any case, you'll save valuable time by producing the job on an Oliver of Adrian contour sawing and filing machine.

Parts for jigs and fixtures, dies, gages, templates and special machine production can be shaped to dimension faster — easier — at less cost. No hand filing or semi-finishing operations. Better investigate Oliver today. Just write. Available in five sizes — bench or pedestal.



OLIVER of ADRIAN

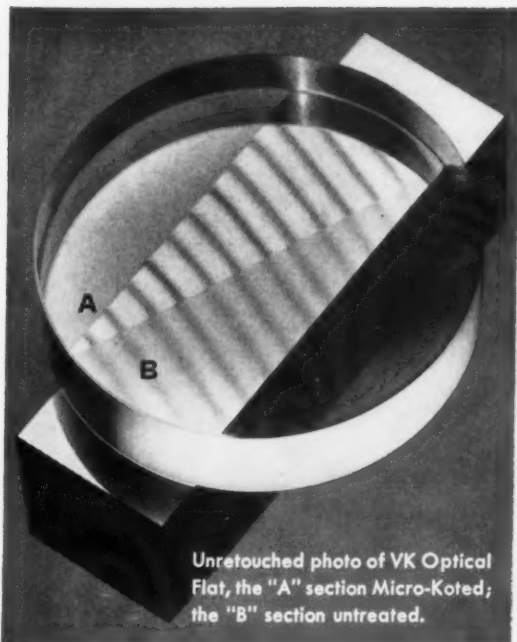
OLIVER INSTRUMENT COMPANY

1430 E. Maumee St. • Adrian, Michigan

For more data circle 323 on Postpaid Card

Checking
surface flatness
down to $\frac{1}{10}$
of a band?
(.000001-inch)

It's easy with the
**VAN KEUREN
MICRO-KOTED*
OPTICAL FLAT**



Unretouched photo of VK Optical Flat, the "A" section Micro-Koted; the "B" section untreated.

Elimination of the fuzzy edges of the interference bands gives you *greater precision and readability*...and faster checking, too, because you get the pattern quicker. There's stronger contrast, a brighter field. The narrow band, very black and sharp-edged, has a width corresponding to a height difference of about .000001".

Originated by Van Keuren in 1957, these Micro-Koted flats are perfect for checking bronze, brass and other metals used for magnetic seals, and for checking other critical parts, for surface flatness.

Write today for descriptive leaflet, "Micro-Koted Flats".

* VK Micro-Koted Optical Flats are treated on one side with a transparent layer of hard metal.



THE *Van Keuren* CO.
Since 1920

175 Waltham Street, Watertown 72, Mass.
PRECISION MEASURING TOOLS
... rated the world's most accurate

Plug Gages · Measuring Wires · Optical Flats and Light Wave Equipment · Gage Blocks · Precision Lapping Service and Parts

For more data circle 324 on Postpaid Card

March, 1959

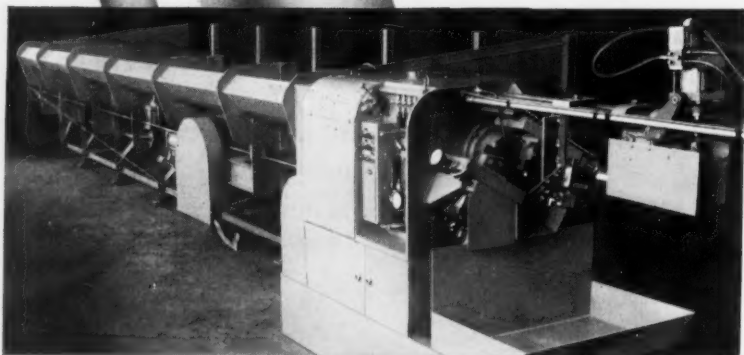
modern machine shop 23



the Modern Way

Fast CUTTING-OFF of TUBING and BAR STOCK

Automatic operation—
from loading to final cut-
off. Handles tubing up to
8" O.D. Very fast. With
special tools, parts being
cut off may be formed,
grooved, flanged or
chamfered in a single
operation—at a high rate
of speed.



WRITE for CATALOG

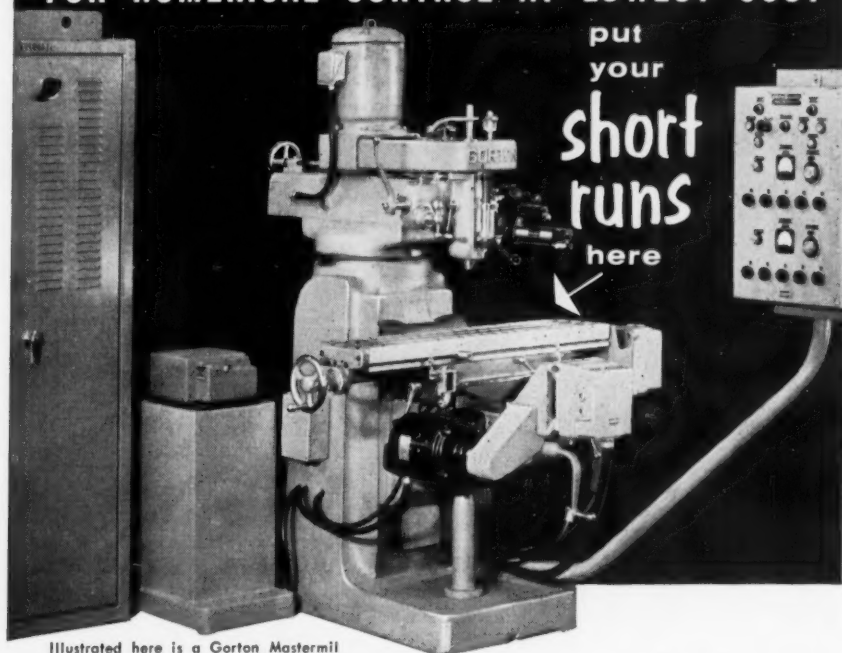
New catalog describes all models—gives
production figures. Mailed on request.

MODERN MACHINE TOOL CO.

2005 Losey, Jackson, Michigan

For more data circle 325 on Postpaid Card

FOR NUMERICAL CONTROL AT LOWEST COST



Illustrated here is a Gorton Mastermill with O-16A Super-Speed Spindle Head and Ram Assembly with G. E. Mark II Numerical Control System.

GORTON NUMERICAL CONTROL is field tested and proved in use

This is how Gorton Numerical Control saves you money on short runs:

- eliminates elaborate and costly tools, dies, jigs and fixtures
- wastes no time because operator does not "pace" the work
- makes no mistakes because operator skill not required
- extreme, repetitive accuracy is easy and automatic
- change overs in set-ups can be made quickly
- signals operator when tool changes are needed
- guides cutter in close quarters without damage to work or cutter
- making punched tape is simple typewriter operation

Punched tape . . . or magnetic tape control . . . is available to you on SIX standard Gorton machines and also on Gorton custom-designed machines. You'll be agreeably surprised when you learn the low cost of Gorton Numerical Control and how much more it gives you for your money. For full information write

Saves You Money on—

- face milling
- side milling
- end milling
- straight line cavity milling
- slotting
- drilling
- reaming and boring



GEORGE GORTON MACHINE CO.

1703 RACINE STREET

RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators—standard and special. . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle 326 on Postpaid Card

1017

March, 1959

modern machine shop 25



Eclipse

CUTTING TOOLS

are

"Engineered for You!"

For almost half a century ECLIPSE has engineered and produced quality cutting tools. These years of leadership in the field guarantee the superiority and dependability of all ECLIPSE products. For longer tool life, finer finishes and better all-around performance, look to the symbol of perfection.



- H.S.S. CUTTERS
- T.C.T. CUTTERS
- CORE DRILLS
- BACK SPOTFACERS
- MULTI-DIAMETER CUTTERS
- INSERTED BLADE CUTTERS
- PORT CONTOUR CUTTERS

WRITE FOR CATALOG 51



ECLIPSE COUNTERBORE COMPANY

1600 BONNER AVE., DETROIT 20, MICHIGAN

For more data circle 327 on Postpaid Card

Speed FORMING and FABRICATING



Quick Facts Folder describes these and other Di-Acro machines. Ask for your copy today. O'NEIL-IRWIN MFG. CO.

di-acro
PRECISION
METALWORKING
MACHINES

"Consult the yellow pages of your phone book under Machinery, Machine Tools for the name of your nearest Di-Acro distributor or write us."



306 EIGHTH ST.
LAKE CITY, MINN.

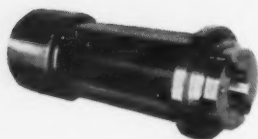
 <p>Benders 5 Models</p>	 <p>Spring Winder 1 Model</p>	 <p>Press Brake 1 Model</p>
 <p>Hydra Power Bender 2 Models</p>	 <p>Rod Parter 2 Models</p>	 <p>Power Parter 1 Model</p>
 <p>Notcher 1 Model</p>	 <p>Power Notcher 1 Model</p>	 <p>Power Press Brake 1 Model</p>
 <p>Shears 4 Models</p>	 <p>Punch Press 2 Models</p>	 <p>Power Punch 2 Models</p>
 <p>Rollers 8 Models</p>	 <p>Brakes 10 Models</p>	 <p>Powershear 4 Models</p>

For more data circle 328 on Postpaid Card

FOR **BIG, HEAVY DUTY** **PRECISION SPINDLES**

that produce **BIG** savings in production cost

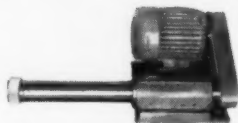
SPECIFY **POPE**



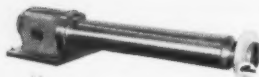
POPE P-18670 Heavy Duty, High Speed Milling Spindle, 4 ft. long, 10 in. dia.; weight about 1000 lbs.



POPE P-18842 Deep Hole Internal Grinding Spindle, 10 HP, 7 ft. long, 12 in. dia. barrel; weight 4000 lbs.



POPE P-5794B Motorized Deep Hole Grinding Spindle, 10 HP, 36 in. long, 6 in. dia. barrel, for use in horizontal or vertical position on boring mills or planers; weight about 800 lbs.



POPE P-18844 Vertical Bearing Grinder Spindle, 20 HP, 6 ft. long, 12 in. dia. barrel; weight approx. 4000 lbs.



POPE P-1098 Heavy Duty Internal and External Grinding Spindle, 50 HP, for wheel of 30 in. dia. and 12 in. width; weight approx. 6000 lbs.



POPE P-10009E Motorized Deep Hole Grinding Spindle, 5 HP, 36 in. long, 5 in. dia. barrel; weight 600 lbs.



POPE P-1076 Cylindrical Grinding Spindle, designed for crush dressing and form grinding; 5 ft. long, 10 in. dia. barrel, for 24 in. dia.; 4 in. wide wheel; weight about 1250 lbs.



POPE P-A1 Deep Hole, Ram Type Grinding Spindle attached to boring machine, 10 HP, 10 ft. long, 10 in. dia. barrel; weight 2000 lbs. (For purposes of comparison, a Pope P-32 6" x 18" Surface Grinder Spindle is shown in the foreground.)

Send us your specifications and get prompt quotations on the one best Spindle for your work, out of the 20,000 different Precision Spindles that bear the name "POPE".

No. 125

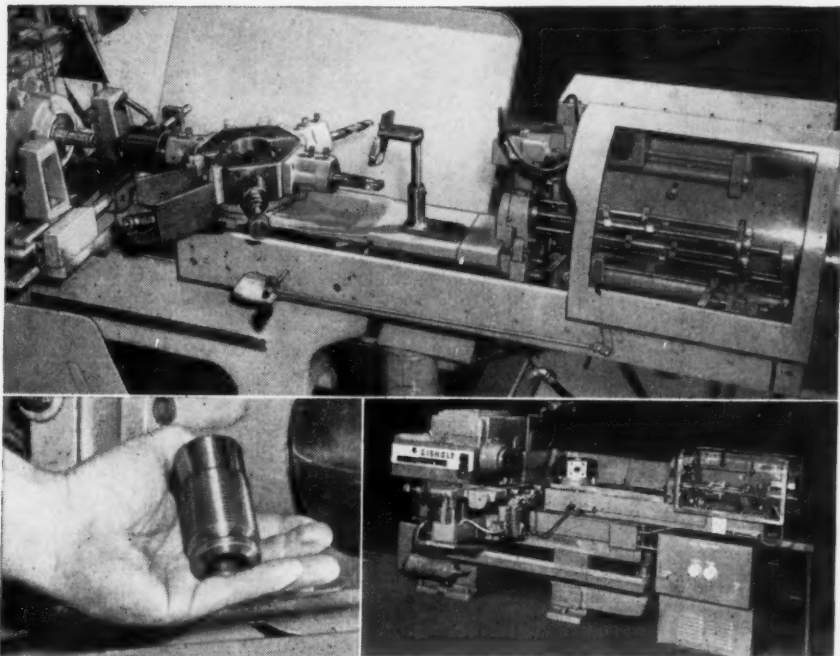
POPE®

**ENGINEERS AND BUILDS STANDARD AND SPECIAL
PRECISION ANTI-FRICTION BEARING SPINDLES
FOR EVERY PURPOSE**

POPE MACHINERY CORPORATION • 261 RIVER STREET • HAVERHILL, MASS.

Established 1920

For more data circle 329 on Postpaid Card



250% Production Increase with this setup

Gets full automation on small job-lot production runs using hydraulic drive on Gisholt Ram Type Turret Lathe

Floor-to-floor time on the job shown here—a threaded collar $3\frac{1}{4}$ " long with $1\frac{1}{8}$ " diam.—was cut from 8.1 minutes (with hand operation) to just 3.25 minutes. All operations and machine functions are automatically controlled with the Lynn Hydraulic Drive Unit on a Gisholt Ram Type Turret Lathe.

Here's how the finished workpiece is completely machined from bar stock in one fast, automatic operation: The stock is fed pneumatically against a turret stop, chucked, start-drilled, then finish-bored with a large drill. The hydraulic drive backs the drill out automatically to clear the chips, then rapid traverses back to where it left off before dropping into feed to resume

drilling. Spindle speed automatically decreases as tools on the front cross slide form the O.D., drops into lower speed as O.D. is threaded, and into another low speed as radii are formed on the finished part and on the end of the bar stock. A tool on the rear cross slide cuts off the finished part and the job is done in record time.

With its massive design, reserve power and extra spindle speeds, the new Gisholt MASTERLINE Ram Type Turret Lathe is particularly adaptable to complete automatic operation with Lynn Hydraulic Drive. Contact your Gisholt Representative. He has the complete facts—and his wide experience may point the way to more profitable operation for you.



GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

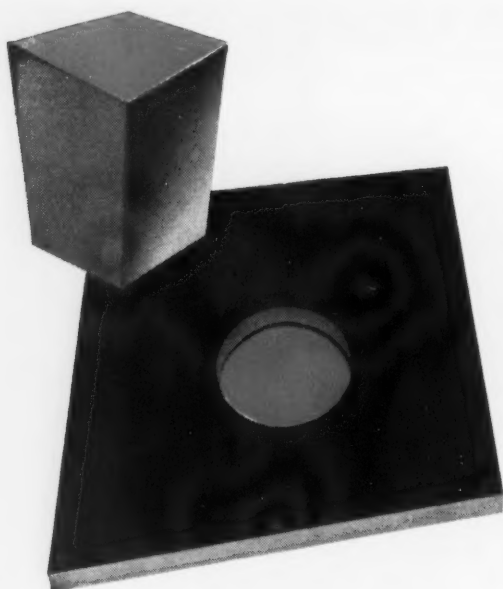
WRITE GISHOLT TODAY for new Bulletin 1174-B, covering new MASTERLINE Ram Type Turret Lathe. Also new Catalog 1182-A on Ram Type Turret Lathe with Hydraulic Drive.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

For more data circle 330 on Postpaid Card

March, 1959

modern machine shop 29



There's an interesting "Inside Story" about Ace Drill Bushings. The walls, inside and out remain consistently || parallel even after long, hard wear. Ace's greater drill bearing surface produces better work with longer life of both drill and bushing.

Ace Drill Bushings are made right . . . to wear right. They guarantee a maximum concentricity of .0003" t.i.r. . . usually it is far less. You can depend upon ACE Drill Bushings. They are consistently **the best** in every way. **Always specify ACE!**

Inconsistency!

Does anyone expect perfect teamwork between a straight drill and a () barreled out or a)(bell-mouthed drill guide? Of course not! That's as inconsistent as looking for close tolerance between a square peg and a round hole.

If your drilling operations demand maximum accuracy, **THINK FIRST OF ACE . . .** the proven superior precision drill guide.



ACE DRILL BUSHINGS

NEW JERSEY
611 McCarter Highway
NEWARK 2
Mitchell 2-3006



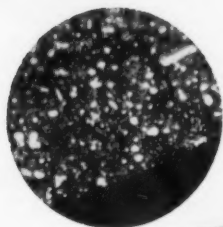
HOME OFFICE
CALIFORNIA
5407 Fountain Ave.
LOS ANGELES 29
Hollywood 9-8253



MICHIGAN
10620 West Nine Mile Road
DETROIT 37
Lincoln 8-0777

For more data circle 331 on Postpaid Card

Foremost Toolmakers Approve Sentry Hardening



LOOK into some of America's leading tool rooms to learn how to make your production tools the finest! You'll find that many of the foremost hardeners entrust their precious high speed tools only to the Sentry Diamond Block method of atmosphere control.

The reason why? Sentry hardening is sure. Valuable tools of any steel hardening above 1700°F. can be fully hardened without danger of scale or decarburization. Surface spoilage is positively eliminated.

A demonstration of hardening on your own tools will convince you of Sentry benefits. Why not send us samples?

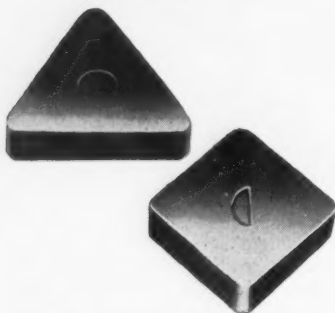
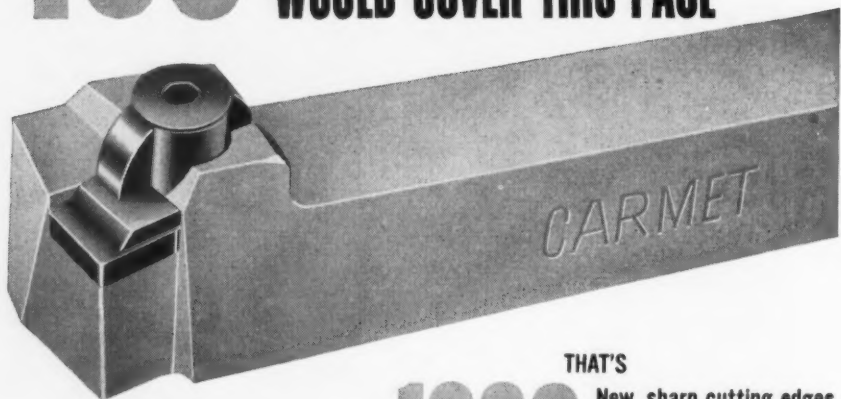


Sentry TRADEMARK ELECTRIC FURNACES

Request Catalog D-12 • Write **THE SENTRY CO., FOXBORO, MASS.**

For more data circle 332 on Postpaid Card

165 CARMET INDEXABLE SQUARE CARBIDE INSERTS WOULD COVER THIS PAGE



Over 118 styles and sizes of Indexable Inserts to use in Carmet high-alloy, cadmium plated Tool Holders in both positive or negative rake types.

Write for new Catalog C-16

CARMET CEMENTED CARBIDES FOR INDUSTRY



This 32-page first edition contains prices and complete specifications on Carmet's full line of cemented carbide tipped tools, Indexable Inserts, blanks and holders. Speed and feed charts, grade comparisons and ordering information included.

ADDRESS DEPT MS-15

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THAT'S

1320

New, sharp cutting edges for about 10¢ each to do almost all metal cutting jobs

THEY'D REPLACE

1320

Individual, brazed single-point tools.
No tool regrinding.
Minimum tool changing.

Why not find out more about Carmet Indexable Inserts and the complete line of Carmet cemented carbide tools and standard blanks? Your Carmet distributor carries them in stock, assures prompt delivery and will aid you in selecting the proper grades and styles to cut your metal-working costs. Call him today or write Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.

W809-7333

CARMET

CEMENTED CARBIDE DIVISION OF
ALLEGHENY LUDLUM STEEL CORPORATION



↓ Use this Postpaid Card for requesting more information on products described and advertised ↓

READER SERVICE CARD

MARCH, 1959

modern
machine
shop

Your Name _____

Your Title _____

Company Name _____

Company Address _____

City _____

Zone _____

State _____

431 Main Street, Cincinnati 2, Ohio

Products Manufactured _____

Number of Plant Employees _____

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue

EDITORIAL ITEMS

1	26	51	76	101	126	151	176	201	226	251	276
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4	29	54	79	104	129	154	179	204	229	254	279
5	30	55	80	105	130	155	180	205	230	255	280
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ADVERTISEMENTS

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318 339 360 381	402	427	452	477	502	527	552	577	602
319 340 361 382	403	428	453	478	503	528	553	578	603
320 341 362 383	404	429	454	479	504	529	554	579	604
321 342 363 384	405	430	455	480	505	530	555	580	605
322 343 364 385	406	431	456	481	506	531	556	581	606
323 344 365 386	407	432	457	482	507	532	557	582	607
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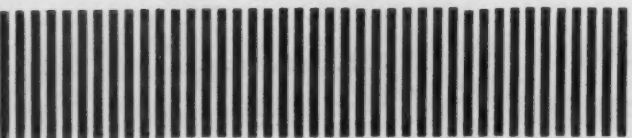
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FIRST CLASS

PERMIT No. 1702

CINCINNATI, OHIO



NOW, no more part-time milling machine with
with

J & S NO-BEND

*hardened & ground
detachable*

**Milling machine ARBORS,
ADAPTERS and
live bearing supports**

**Full-time tooth
engagement, plus all
these features:**

Interchangeable to 40 or 50
taper machines • quick change
• lower cost • more production
• longer cutter life • correct arbor
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Write for free literature and price list.



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**871 DORSA AVE.
LIVINGSTON, NEW JERSEY**

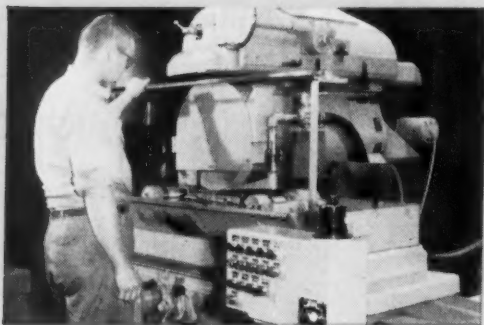
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March, 1959

modern machine shop 33

Thompson

**TRUFORMING CUTS COSTS 66%
... DOUBLES PRODUCTION AND IMPROVES PRODUCT
AT THE OLIVER CORPORATION**



In the production of ledger plates, used in the cutter bar of mowing machines, The Oliver Corp. of Chicago, formerly first milled the teeth, then hardened the plate. The hardening process caused distortion and variance in uniformity which impaired the cutting action of the bar.

On the advice of Thompson engineers, a Type BB Truforming Grinder with a 2½" width grinding wheel was installed to process these ledger plates as a finished grinding operation. The plates are now heat treated first and the teeth are then formed by grinding.

The installation of the Thompson Truforming Grinder has accomplished the following results:

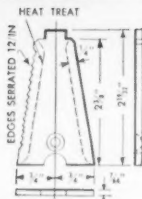
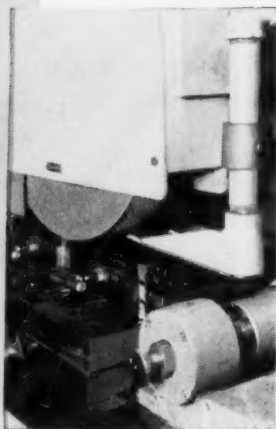
1. Cut total production costs from \$3.18 to \$1.06 per 100 pieces.
2. Increased the production rate from 1600 to over 3600 pieces per 8-hour shift.
3. Provided constant uniformity in the workpieces.
4. Eliminated the full-time service of one man.*
5. A pair of \$160.00 milling cutters formerly produced 20,000 pieces. A \$60.00 grinding wheel now produces well over 40,000 pieces.

The leadership of Thompson Truforming Grinders results from 25 years of research and development work in crush form grinding. Today these machines are opening up hundreds of practical, time-saving, profit-improving and cost-cutting applications for industry.

Thompson's engineering experience is available to you without obligation. Write for Catalog T558.

*Automatic machine cycle allows operator time to countersink hole in plate—an operation formerly requiring one man's full time.

THE THOMPSON GRINDER CO.
SPRINGFIELD, OHIO

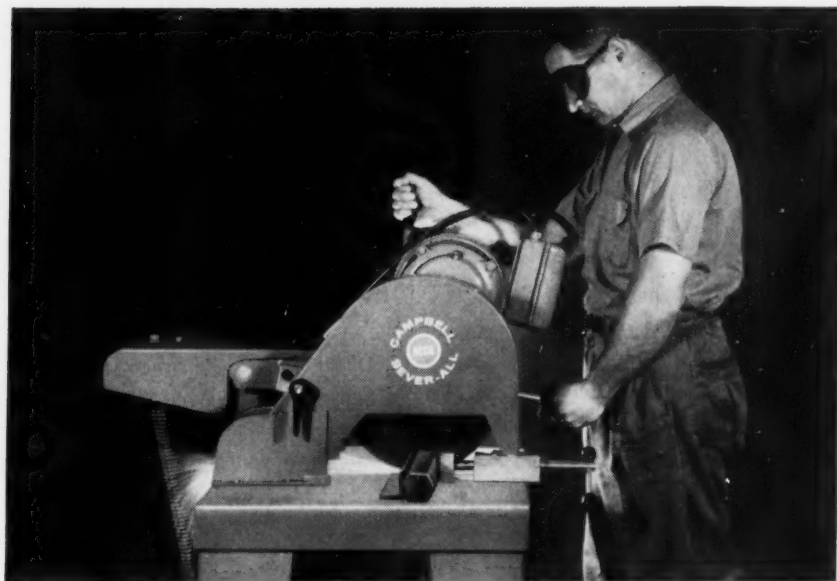


LEDGER PLATE
High Carbon Manganese Steel
Rockwell C52-58

"Keep Thompson
in mind for that daily grind"



For more data circle 335 on Postpaid Card



Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

LOW COST • Priced at less than \$500, delivered.

BIG CAPACITY • Up to 2" square solids, 3½" O. D. pipe and tubing, 3" angle iron, and 4" channels. Wheel oscillation, an exclusive feature in this price range, provides this above-average capacity.

SPEED • Cuts a 2" x 2" hardened steel bar in 16 seconds . . . practically any metal at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

VERSATILITY • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

ECONOMY • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. Little or no set-up time required.

NEW SEVER-ALL

AVAILABLE FROM DISTRIBUTORS

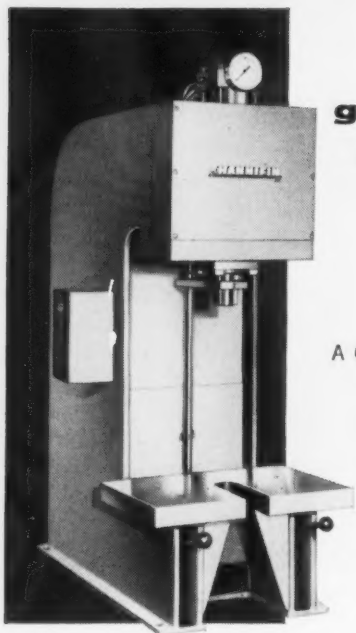
Very likely your own distributor already stocks the Model 1-A SEVER-ALL Abrasive Cutting Machine and Wheels. If not, we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for Bulletin DH-106.

**ALLISON-CAMPBELL DIVISION
AMERICAN CHAIN & CABLE**

931-S Connecticut Avenue, Bridgeport 2, Conn.

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**get more production
at lower cost with**

HANNIFIN

"FD" PRESSES

A COMPLETELY NEW LINE OF HIGH-SPEED
HYDRAULIC BENCH PRESSES

FAST DELIVERY—ALL THESE SIZES!

2, 3, 4, 5, 6, 8, 10 and 12 TONS

HEAVY-DUTY OPEN-GAP
PRODUCTION PRESSES

Our quantity production gives you highest quality at lowest cost.

THEY HAVE "EVERYTHING"...

Dual Safety Hand Lever Controls
Dual Electric Push-Button Controls
Adjustable Stroke Control
Reverse on Pressure or Distance
Full Automatic Cycling
Hannifin High Speed Hydraulic Index Tables
Reciprocating Hydraulic Slide Feeds

USE THEM FOR...

Assembly Operations
Riveting — Staking
Forming — Stamping
Trimming Die Castings
Trimming Plastics
Molding Semi-Conductors
Preforming — Compacting

MAY BE FLOOR MOUNTED—OPTIONAL, LOW-COST BASES AVAILABLE

Call in your nearby Hannifin man—he's a trained production analyst—to prove how you can do more at lower cost with Hannifin presses. Or, write for our new Bulletin 132A. It tells the whole story.

HANNIFIN COMPANY

565 South Wolf Road • Des Plaines, Illinois

— A DIVISION OF PARKER-HANNIFIN CORPORATION —

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Illustrated—New 9700 Series

Piggy Back Hydraulic Control Valve

Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic valve design



FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders'
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LOGANSPORT MACHINE CO., INC.
801 CENTER AVENUE, LOGANSPORT, INDIANA

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COMPANY _____

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March, 1959

modern machine shop 37

7 Lapmaster® Job Lapping CENTERS

**Conveniently Located
to Handle Your
Lapping Requirements**



**OPERATED BY
CRANE LAPPING
TECHNICIANS**

Flatness to .000011" . . .
Finish to 2 micro inches in
small lots . . . or production runs.

Fast, dependable deliveries to meet any production schedule.

Wide range of shapes and sizes . . . any metal, ceramics or plastic material . . . can be handled.

Rigid inspection and quality control assures flatness and finish to your exact specifications.

FOR FAST ACTION contact the nearest Lapmaster Lapping Center as listed or write for latest bulletin today.



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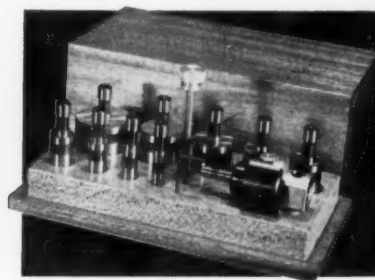
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LAPPING CENTERS

CRANE PACKING COMPANY

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take the guess-work out of Profiling !



with an
Adjustable
STYLUS HOLDER

DEFLECTION PROBLEM SOLVED

Compensate for any amount of deflection with a simple, quick adjustment.

MINIMUM DOWN TIME

Eliminate search for matching cutter and stylus. Select cutter, then adjust holder to proper size.

CUTTER COST REDUCED

Prolong cutter life—regrind to sharpen only—size is no factor. Any size cutter performs equally well as new one.

GREATER ACCURACY

Accuracy no longer depends on finding stylus and cutter of exact size. The micrometer screw in the adjustable stylus holder permits controlled stock removal.

MINIMUM STYLII REQUIRED

Nine stylii do work of 70 to 100. In 3 dimensional work, when cutter change is required, stylus need not be replaced.

TEMPLATE ERRORS CORRECTED

These discrepancies in template can often be "adjusted out" while cutter is in motion.

9 Stylii will
cover
complete
work range

9



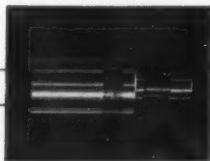
70

70 or more
stylii
formerly
required for
complete
work range

CRITERION
TOOL  **PRODUCTS**

CRITERION MACHINE WORKS

765 WEST SIXTEENTH STREET
COSTA MESA, CALIFORNIA



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March, 1959

modern machine shop 39

Right
down
the line

BAIRD

is your

BEST BUY

in 4-SLIDES

Built in the U.S.A. to machine-tool standards of **QUALITY**.

ALL PARTS for **ALL SIZES** always in stock.

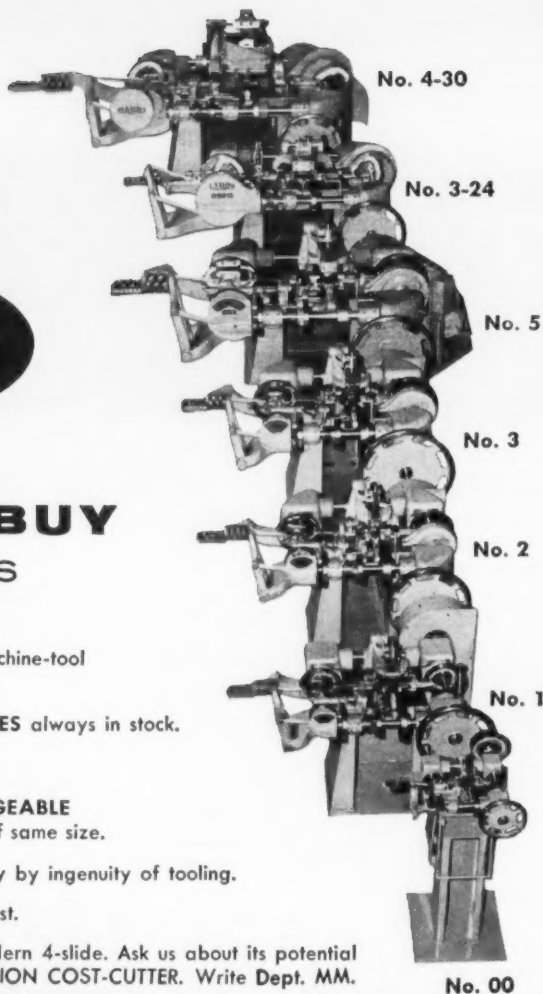
Extremely ACCURATE.

TOOLING INTERCHANGEABLE
one machine to another of same size.

VERSATILITY limited only by ingenuity of tooling.

EASIEST to tool and adjust.

BAIRD pioneered the modern 4-slide. Ask us about its potential as a **COMBINED-OPERATION COST-CUTTER**. Write Dept. MM.



THE BAIRD MACHINE COMPANY
S T R A T F O R D • C O N N E C T I C U T

BAIRD

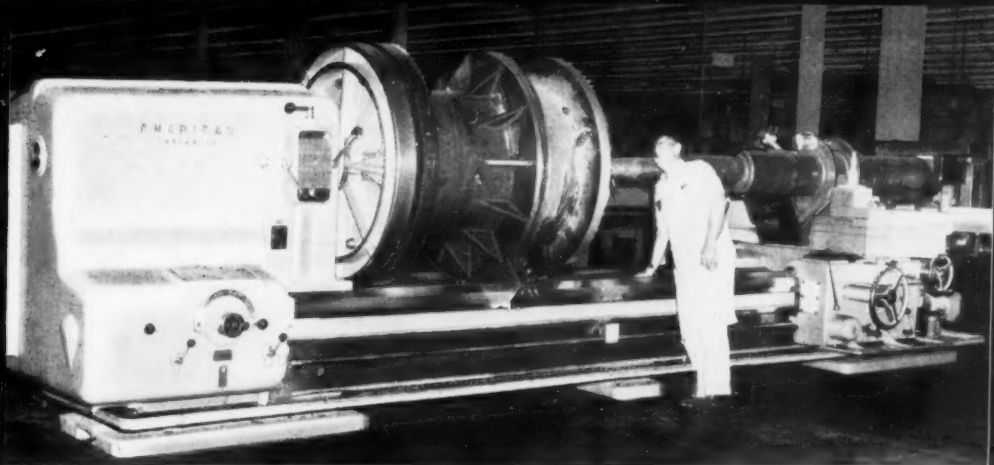
Six and Eight Spindle Chucks • Automatic Multiple Transfer Presses • Automatic 12 Station Duplex Turning Machines •
Vertical Continuous Lathes • Automatic Four Slide Machines • Prestormatic Ribbon Metal Forming Machines • Barrel Finishing
Machinery • Machinery for Chain and Roller Chain Production • Gormet Hook and Eye Production • Precision Bench Presses

9BAS6B

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40 modern machine shop

March, 1959



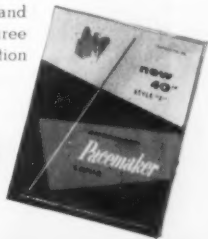
HERE'S THE VISUAL ANSWER!

Any question about the capacity of "AMERICAN" Lathe Spindle bearings or the stiffness of "AMERICAN" Spindles is certainly answered by this illustration.

Here is a 40" "J-9" "AMERICAN" Deluxe Model Hydraulic Duplicating Lathe (one of three, 40" "J" "AMERICANS") in the Charlotte, North Carolina plant of the Douglas Aircraft Company, Inc., boring a 54" diameter bulge die weighing five (5) tons. This illustration shows an ingenious roller rest made by Douglas but on many operations no steady rest is used.

This is a 60 horse power lathe with spindle and spindle bearings of tremendous capacities, consequently is ideally adapted to "elephant" operations of this nature and there are other exclusive design features contributing to the excellence of this big lathe, such as the extremely rigid 4-vee bed; the brand new massive 71/2" diameter spindle tailstock; the patented three bearing, triple drive spindle; its 100% anti-friction construction and full automatic oiling.

The many ultra modern and superlative features of "AMERICAN" Deluxe Model Pacemakers are described and thoroughly illustrated by bulletin No. 150. May we send you one?



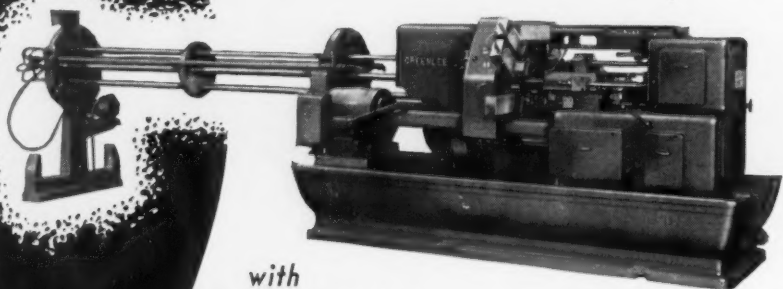
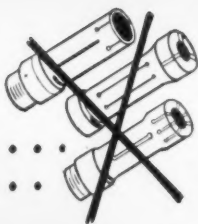
THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

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ELIMINATE

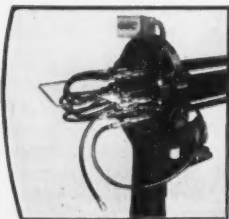
STOCK PUSHERS
FEEDOUT CAMS



with
**GREENLEE
AIR-FEED AUTOMATICS**

You don't need costly stock pushers and feedout cams with Greenlee Air-Feed Automatics. Air lines are connected to the tubes by quick couplings. Vacuum pumps withdraw pistons for fast restocking. Ask your Greenlee

Representative to show you other ways of beating high production costs with Greenlee Air-Feed Automatics.



FAST SET-UPS BECAUSE . . .

- ✓ Wide-open tooling area
- ✓ Interchangeable tool holders
- ✓ Easy-to-change stationary type collets

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A-405

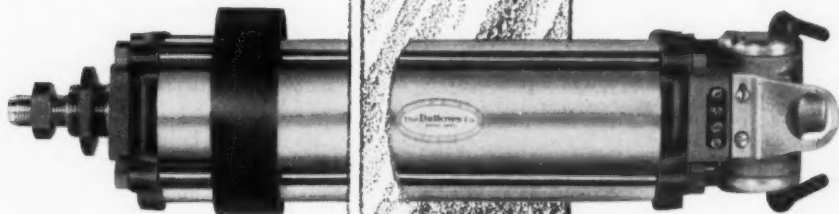


GREENLEE BROS. & CO.
1748 MASON AVENUE
ROCKFORD, ILL.

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THIS SMALL

AIR CYLINDER CAN DRIVE 1/2-INCH



HOLES THROUGH 1/16-INCH STEEL

An ordinary air cylinder of 2 1/2" bore will hardly dent the same piece of steel. But the Bellows Super Speed Air Motor can punch through it at only 100 psi. air line pressure.

That's why the Super Speed is an ideal answer to many staking, forming, riveting, stamping, coining, swedging, cut-off, and similar problems. Try it the next time you need high speed and power! It's faster and more economical.

Super Speeds are available with built-in manual, electric, or pneumatic control valves. Standard stroke lengths are: 2", 4", 6", 9", and 12".

1386-A

We'll gladly send you a bulletin giving full details, including an explanation of why the Super Speed has more speed and power than ordinary cylinders. WRITE DEPT. MMS-359.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

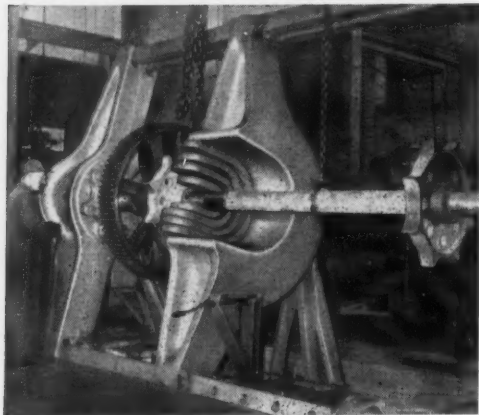
AKRON 9, OHIO

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March, 1959

modern machine shop 43

A MOUNTAIN *of* POWER



POWER FOR BIG JOBS—Here a Rodgers 600-Ton Inclined Forcing Press is forcing a large gear and sprocket from a mine machine shaft.

—or a touch
of pressure

The heavy machines and equipment used in the great iron mining industry present a variety of problems when repair or maintenance is necessary. For this work the accurately controlled action of Rodgers Hydraulic Forcing Presses is a real time and work saver.

A Rodgers Forcing Press puts a mountain of power at your fingertips to force wheels, sprockets or gears from their shafts and for straightening, assembling, swedging or upsetting jobs. Operators also use the versatility, speed, power and positive control of a Rodgers Forcing Press to efficiently perform small pressing and forcing jobs with just a touch of pressure—tasks once done only on vertical shop presses!

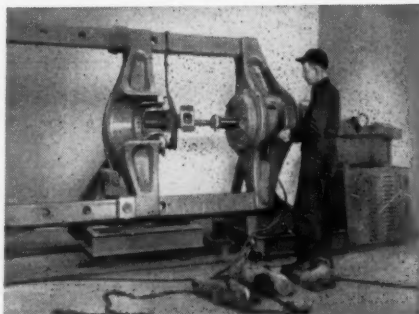
you get both with RODGERS FORCING PRESSES

Rodgers vertical, horizontal and inclined forcing presses offer capacities from 100 to 600 tons . . . up to 9 feet between tension bars . . . up to 16 feet between ram and abutment . . . single or double acting cylinders with 13 or 26-inch ram travel (72-inch travel available) . . . electrically powered hydraulic pumps with selective, positive pressure adjustment and remote control . . . removable press cylinders that can be used in special jacking or pulling jobs . . . and many more features that assure you of dependable, long life operation — all fully described in Rodgers Catalog Number 315A.

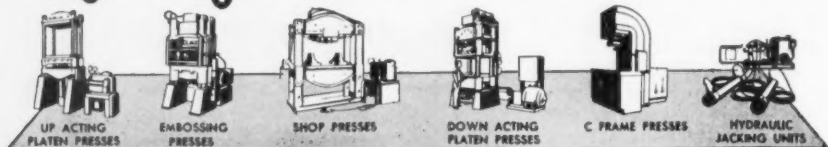


Write for it today!

Rodgers Hydraulic Inc. 7447 Walker St., Minneapolis 26, Minn.



LIGHT TOUCH FOR SMALL JOBS—This Rodgers 300-Ton Inclined Forcing Press is used on small as well as large equipment repairs. Here, a pin is being pressed out of a tractor idler support bracket.



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A PRODUCT OF SKILL



the complete line

Butterfield drills, reamers, taps, dies, counterbores, cutters, end mills, hobs and carbide tools are craftsmanship-produced and are delivered rapidly anywhere. Warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York and San Francisco. **Call your Butterfield Distributor.**

BUTTERFIELD

BUTTERFIELD DIVISION, UNION TWIST DRILL COMPANY, DERBY LINE, VERMONT

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March, 1959

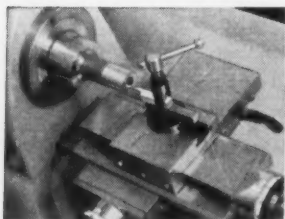
modern machine shop 45



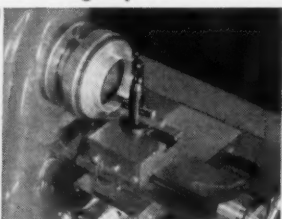


HIGH SPEED PRECISION LATHE

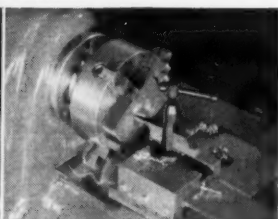
Correct Size - High Speed - Precision Results



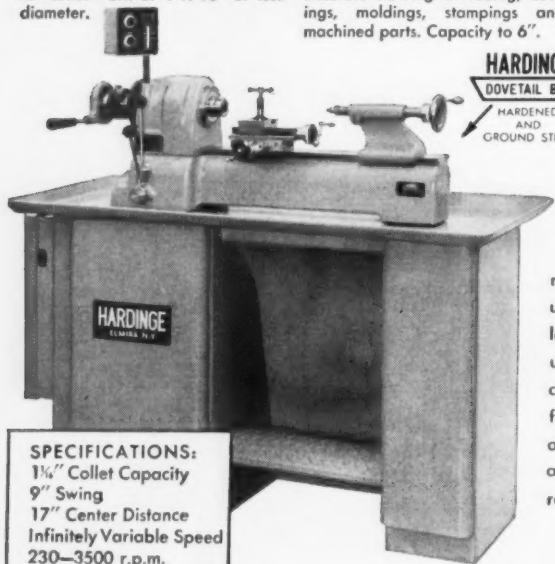
Collet Work — The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".



HARDINGE

DOVETAIL BED

HARDENED
AND
GROUND STEEL

SPECIFICATIONS:
1 1/4" Collet Capacity
9" Swing
17" Center Distance
Infinitely Variable Speed
230—3500 r.p.m.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV 59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results.

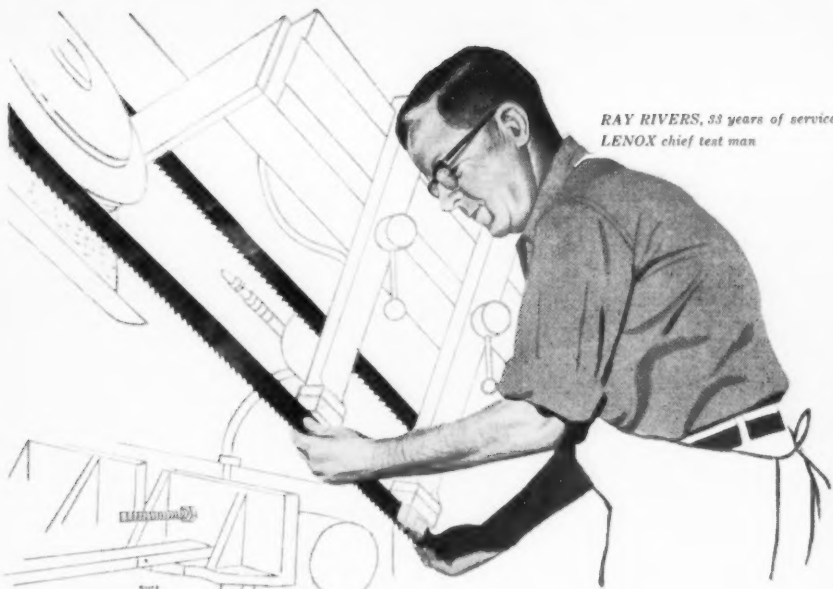


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OFFICES IN PRINCIPAL CITIES: Export Office: 269 Lafayette Street, New York 12, N. Y.

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RAY RIVERS, 33 years of service,
LENOX chief test man

LENOX HIGH SPEED STEEL band saw blades

Cut faster . . . take greater feeds . . . last longer than conventional sawing methods, the new *LENOX High Speed Steel*

Band Saw Blades assure greater production rates. Recommended specifically for special high speed steel band saw machines, these new Lenox blades have performed successfully on some regular band saw machines. Available in standard and hook tooth design.



AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASSACHUSETTS • U.S.A.

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March, 1959

modern machine shop 47

Cut a KEYWAY for ONE CENT

Minute Man

**KEYWAY
BROACH KIT**



In one minute and for as little as one cent you can cut a keyway with the Minute Man Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".

**SAVE MONEY WITH
THESE OTHER STANDARD
STOCK BROACHES**


SQUARE BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes


HEXAGON BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes


ROUND BROACHES — $\frac{1}{4}$ " to 1" holes

**SEND FOR CATALOG
AND PRICE LIST**

**The duMont Corp.
Greenfield, Mass.**

MAIL FREE BROACH CATALOG AND
PRICE LIST S describing Square Broaches,
Hexagon Broaches, Production Type Keyway
Broaches and Keyway Broach Kits to

Name.....

Company.....

Address.....



duMont

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

MARCH 9-10 • Steel Founders' Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

MARCH 11-13 • Pressed Metal Institute, Spring Technical Meeting, Pick-Congress Hotel, Chicago. Institute headquarters: 3673 Lee Rd., Cleveland 20, Ohio.

MARCH 16-20 • American Society for Metals, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles. Society headquarters: 7301 Euclid Ave., Cleveland 3, Ohio.

MARCH 16-20 • National Association of Corrosion Engineers, Annual Conference and Exhibit, Sherman Hotel, Chicago. Association headquarters: 1061 M & M Bldg., Houston 2, Texas.

MARCH 17-19 • Investment Casting Institute, Annual Meeting, Surf Rider Hotel, Santa Monica, Calif. Institute headquarters: 27 E. Monroe St., Chicago 3, Illinois.

MARCH 17-19 • American Machine Tool Distributors Association, Spring Meeting, Sheraton Park Hotel, Washington, D. C. Association headquarters: 1900 Arch St., Philadelphia 3, Pennsylvania.

APRIL 6-8 • American Hot Dip Galvanizers Association Inc., Annual Meeting, Empress Hotel, Miami Beach, Fla. Association headquarters: 1806 First National Bank Bldg., Pittsburgh 22, Pennsylvania.

APRIL 6-10 • American Welding Society, Welding Show and Technical Meeting, International Amphitheatre and Sherman Hotel, Chicago. Society headquarters: 33 W. 39th St., New York 18, New York.

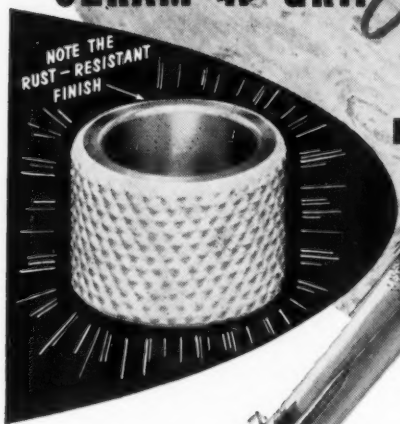
APRIL 18-22 • American Society of Tool Engineers, Annual Meeting, Schroeder Hotel, Milwaukee. Society headquarters: 10700 Puritan Ave., Detroit 38, Michigan.

CERAM-A GRIP

American's New ceramic

Precision Drill Bushing for PLASTIC TOOLING

NOTE THE
RUST-RESISTANT
FINISH



CERAMICS — used as a barrier against the tremendously high temperatures encountered by the nose cones on ballistic rockets, has been adapted by the American Drill Bushing Co. to a line of precision drill bushings for use in plastic tooling. The Ceram-A-Grip bushing gives a maximum of protection against bushing misalignment and spin out, with a minimum sacrifice of close hole spacing.

EXCITING
new development
from
the Space Age Laboratories



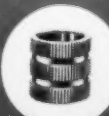
DO YOU HAVE A FRICTIONAL HEAT PROBLEM? THE THIN CERAMIC SHELL PROVIDES AN EFFECTIVE HEAT BARRIER. CERAMIC MATERIAL FUSED TO THE OUTER SURFACE OF THE PRECISION DRILL BUSHING EFFECTIVELY INSULATES THE PLASTIC POTTING MATERIAL FROM ANY EXCESS FRICTIONAL HEAT BUILD-UP IN THE BUSHING.



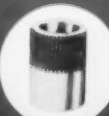
DELTA-A-Grip
Pat. No. 2,898,917



DELTA-A-GROOVE



THERM-A-Grip



SERVO-A-Grip



HEX-A-Grip
Pat. No. 2,728,349



HEX-A-GROOVE



THERM-A-Grip
Pat. Pending



SERVO-A-Grip
Pat. Pending

LOOK TO
American
FOR A COMPLETE LINE
OF DRILL JIG BUSHINGS
FOR
PLASTIC
TOOLING

SEND FOR CATALOG
AND COMPLETE INFORMATION

American

DRILL BUSHING CO.

2107 Pacific Blvd. • Los Angeles 26, Calif.

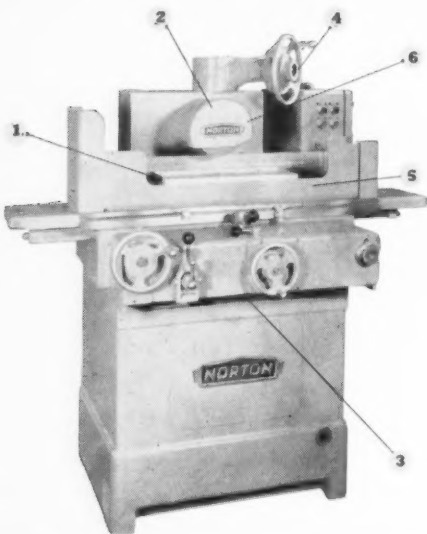
For more data circle 350 on Postpaid Card

March, 1959

modern machine shop

49

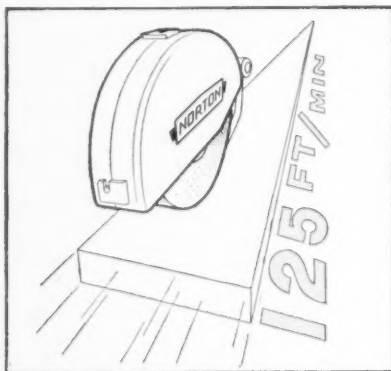
Now—FINISH FLAT



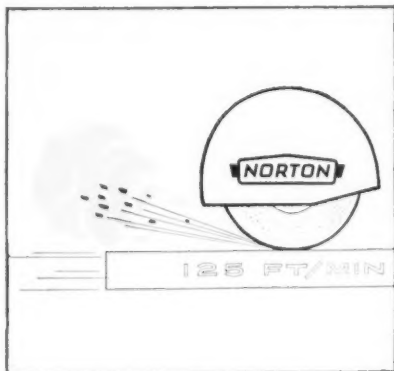
Profit from these benefits . . .

- 1. Get Jobs Done Fast and Cool** — high table speed, *125 feet per minute, maximum.*
- 2. Handle Tall Work Pieces** — greater vertical capacity, *15".*
- 3. Get Lasting Accuracy** with guide-rail cross slide construction.
- 4. Control Vertical Feed Accurately and Position Fast** with two-speed .0001" increment hand wheel.
- 5. Benefit from Better Sighting and Loading** due to contoured splash guards.
- 6. True Forms, Even on Worn Wheels** because of recessed wheel spindle housing.

These and many other new features make this machine a "must" for your surface grinding jobs.



Finish flat faster, cut grinding time and increase production, with high table speed, 125 feet per minute.



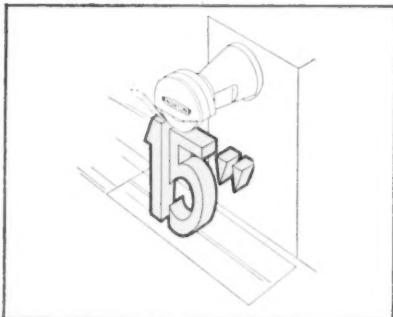
Heat goes off in the chips, due to new, high table speed. This cooler grinding permits faster production on heat-sensitive metals.

FASTER...

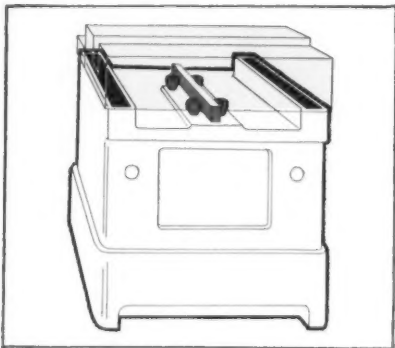
at
lower
cost

New Norton 6" x 18" Surface Grinder

ready for immediate delivery



Handle taller work pieces with high-grind wheel head construction. The vertical capacity from the table top to the bottom of standard full size 8" diameter grinding wheel is 15"



Widely spaced, flat ways and guide-rail cross slide design maintain cross feed accuracy, providing lastingly accurate grinding of shoulders or parallel surfaces.

You FINISH FLAT FASTER with the new Type S-3 hydraulic which is equally efficient for long production runs or a wide variety of toolroom grinding because of its new cost-cutting features. It produces plane surfaces smoothly — with automatic or manual cross feed and with such fast, cool-running action that it saves time and money on every job.

Ask your Norton Representative for the whole story. Or write us direct for Catalog 2128. And remember: only Norton Company offers you such long experience in both grinding machines and grinding wheels to bring the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

To Economize, Modernize with NEW



GRINDERS and LAPPERS

*Making better products...
to make your products better*

NORTON PRODUCTS

Abrasives • Grinding Wheels • Grinding Machines
Refractories • Electrochemicals
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

District Offices

Worcester • Hartford • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

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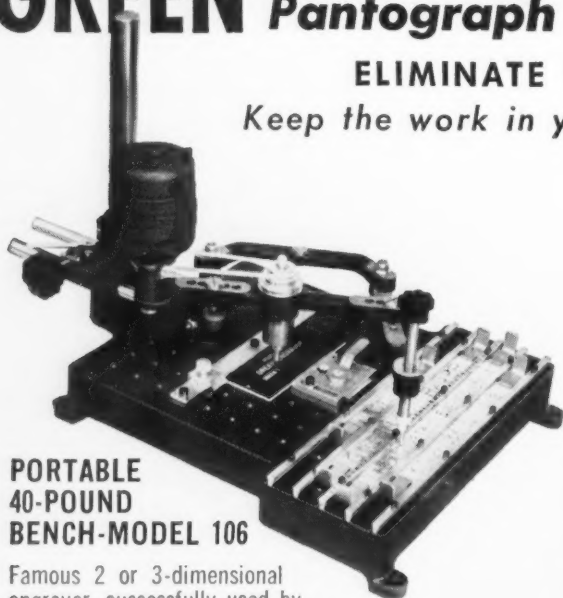
March, 1959

modern machine shop 51

GREEN *Pantograph Engravers*

ELIMINATE DELAYS!

Keep the work in your own plant.



PORTABLE 40-POUND BENCH-MODEL 106

Famous 2 or 3-dimensional engraver, successfully used by thousands, features 5 positive, accurate pantograph ratios. Versatile ball bearing spindle has three speeds up to 14,000 rpm; height of pantograph and position of cutter are continuously adjustable; one copy carrier (supplied) accepts all standard master type sizes.

The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

Cutter grinders, rotary tables, master letters, compound slides, name plates and all required accessories. For complete information, write to



MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

- 575 pounds — rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Micrometer adjustment for depth of cut
- Ball-bearing construction throughout — super-precision ball bearing spindle
- Spindle speeds up to 26,000 rpm for engraving or machining modern materials
- Ratios 2 to 1 to infinity — master copy area 26" x 10"
- Vertical range over 10"



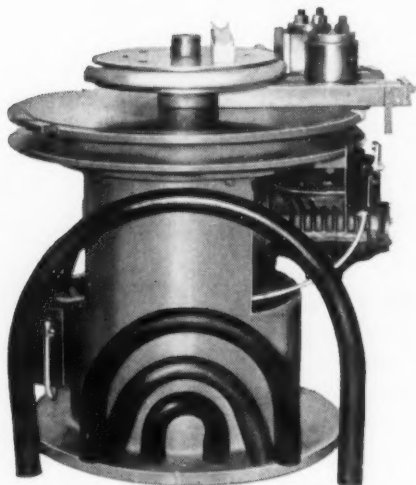
**GREEN
INSTRUMENT
COMPANY, INC.**

392 PUTNAM AVENUE, CAMBRIDGE 39, MASS.

For more data circle 352 on Postpaid Card



any size
or shape



Whatever the size or shape of the bend for your pipe, tube or structural metal part, a **PEDRICK PRODUCTION BENDER** can do the job fast, accurately and economically. Let us demonstrate. Write **PEDRICK TOOL AND MACHINE Co.**, 3640 N. Lawrence St., Philadelphia 40, Pa. Dept. 5.

*Free "Pedrick Line" Bulletin.
Write today.*

PEDRICK
PRODUCTION BENDERS

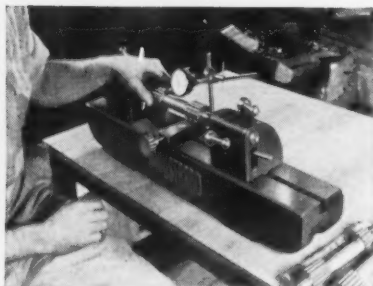
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March, 1959

modern machine shop 53

Save time, improve checking accuracy with these Sundstrand accessories

A wide range of sizes in the most modern checking accessories available—that's what you get from Sundstrand. Industry wide acceptance of these Sundstrand accessories is your guarantee of outstanding performance.

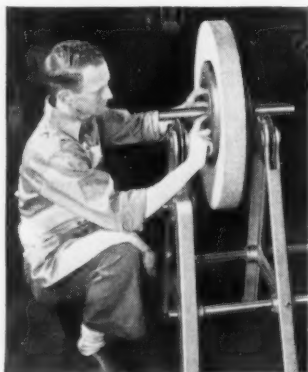


Check runout within .0001" limits

on gears, sprockets, pinions, etc. on this modern Sundstrand bench center insuring simpler assembly and higher production. Because of Sundstrand's "one-hand control" over-all movable elements, the other hand is left free to control rotation of the part. Complete table of sizes available is at left.

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Quick, precise balancing of grinding wheels, pulleys, flywheels, etc., in a choice of nine sizes of balancing tools is offered by Sundstrand. These sensitive, durable tools are portable (except for No. 5 extra-heavy duty) and can be placed where needed without leveling. Capacities range from 12 to 24,000 lb., 21" to any swing desired, and from 20" to any length desired between standards.



*For complete specifications on these accessories,
write for Bulletin A-551.*



SUNDSTRAND SUNDSTRAND-American BROAD

**DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN**

For more data circle 354 on Postpaid Card



LOCKFORMER

BETT-MARR

BAND SAW



- 24" throat without 24" bulk . . .
- Variable speeds without speed reducer power losses . . .
- Heavy-duty, production cutting at half the price you'd expect to pay!

Big enough for almost any sawing job, small enough to fit most anywhere, the Lockformer Band Saw's low cost makes it a practical and profitable investment for *any* shop. Blade speeds of 100, 600 and 3000 fpm give production speed cutting on wood, plastics, forgings, steel plate, non-ferrous metals and stainless steels. Ball bearings with neoprene seals, cemented carbide blade guides, friction-free and slip-proof chain for final drive and many other top-quality features.

THE LOCKFORMER co.

WRITE FOR
bulletin giving
full facts.

Dept. MS, 4615 West Roosevelt Road
Chicago 50, Illinois

In Canada: Brown Boggs Foundry & Machine Co., Ltd., Hamilton, Ontario
For more data circle 355 on Postpaid Card

March, 1959

modern machine shop 55

Announcing for the missile era:

3 new toolroom aces

Accuracy to the split-tenths

FLASH!

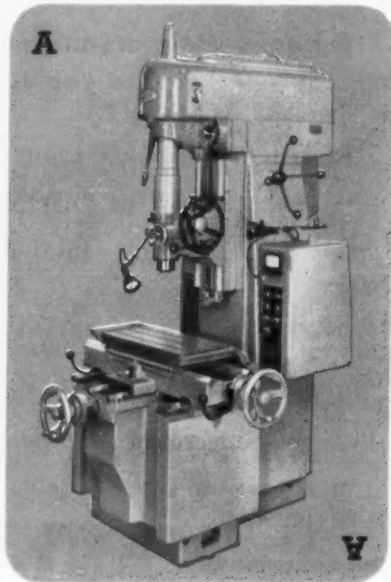
All Moore machines
shipped after
February 15, 1959
are made and
calibrated to the
New
International Inch

DETAILED LITERATURE ON EACH OF THESE
MACHINES IS AVAILABLE ON REQUEST.

LOCATES AND BORES HOLES TO LESS THAN A "TENTH"

No. 3 Moore Jig Borer

For boring, drilling, reaming and spotting holes in dies, jigs and production parts, the speed and accuracy of the Moore Jig Borer has never been equaled. Now, with this new and larger No. 3 model, you will break the "tenth" barrier! Here's why: it offers more precise positioning tolerances...all hardened, ground and lapped ways...no gibs...no overhang...improved drive...wider speed range 60 to 2250 RPM...larger table working surface, 11" x 24"...micro setting of vernier dial...more accessible cross-clamping. These new features, plus sensitive, centralized controls for spindle speeds and feeds, quick tool-changing, easy lubrication add up to a Jig Borer which belongs in every toolroom where tomorrow's accuracies must be achieved today!

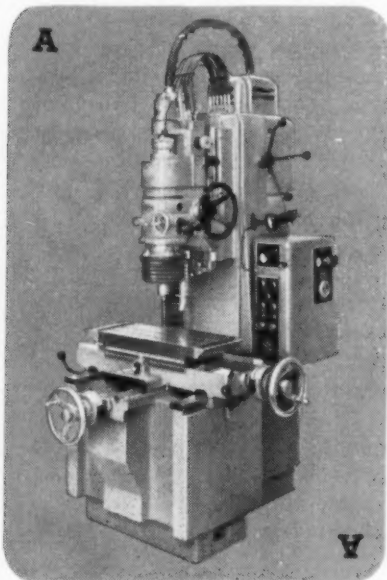


Manufactured by

LOCATES AND GRINDS HOLES TO LESS THAN A "TENTH"

No. 3 Moore Jig Grinder

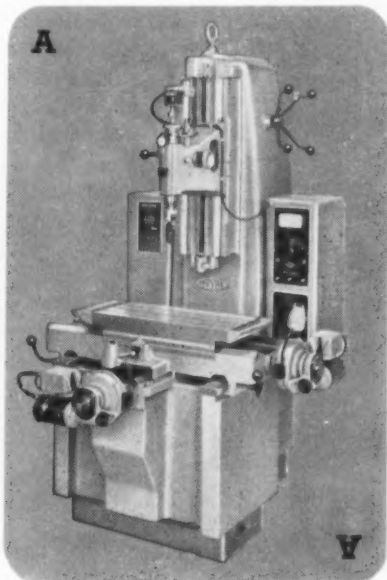
The originators of jig grinding and the Jig Grinder have done it again! Now, with this new, larger No. 3 model, you can grind—with split-tenth accuracy—holes plus regular and irregular contours to size and location after hardening. This is made possible by the closer locational tolerances built into the machine...by the all-hardened-ground-and-lapped ways...by the faster strokes provided for chop-grinding...by the infinite spindle speeds, 40 to 250 RPM...by the larger table working surface, 11" x 24". The same quickly set precision lead screws as in the Moore Jig Borer simplify the finish-grinding process.



MEASURES TO ONE-THIRD OF A "TENTH"

Moore Universal Measuring Machine

This machine, built on the same basic principles as the No. 3 Moore Jig Borer and No. 3 Moore Jig Grinder, introduces a new concept in ultra-precise measurement and inspection. It offers for the first time: A machine combining the capacity for larger work-pieces; choice of electronic indicator supported on an accurate, rotatable spindle, or a universal microscope for pickup; a combination of rectilinear and angular positioning, making possible the measurement of the most complex contours. Design and construction insure the highest possible accuracy. All ways are hardened, ground and lapped steel, fitted to hand-scraped cast iron. Table positioning in two directions of travel is by means of master lead screws. Note motorized lead screw drive—it's optional (for Measuring Machine only).



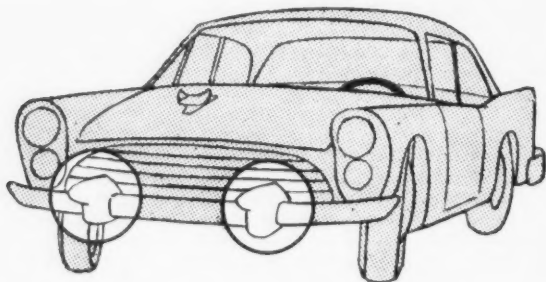
MOORE SPECIAL TOOL COMPANY, INC., Bridgeport, Conn.

For more data circle 356 on Postpaid Card

March, 1959

modern machine shop 57

HY-PRO specialists deliver **100 times longer tap life** with a little difference in design



The standard spiral point tap formerly used for tapping an automobile bumper bracket lasted for 100 holes or less, due to breakage. The cause was misalignment which could not be corrected without prohibitive expense for jigs, and for special controls in preceding operations. HY-PRO specialists designed a no-flute, 3-spiral groove tap with special heat-treatment which boosted production to 10,000 holes per tap — with no change in job specifications. Result —

98% SAVINGS IN TAP COST.

The jobs where tap life can be increased a hundred-fold are obviously exceptional. But it can happen, as this case proves, even in the cost-wise automobile industry. That's why it pays to question tap costs on any job.



The Tap Engineering Specialists

CALL YOUR LOCAL **HY-PRO** DISTRIBUTOR FOR STANDARD TAPS FROM STOCK

HY-PRO TOOL COMPANY • NEW BEDFORD, MASS., U.S.A.

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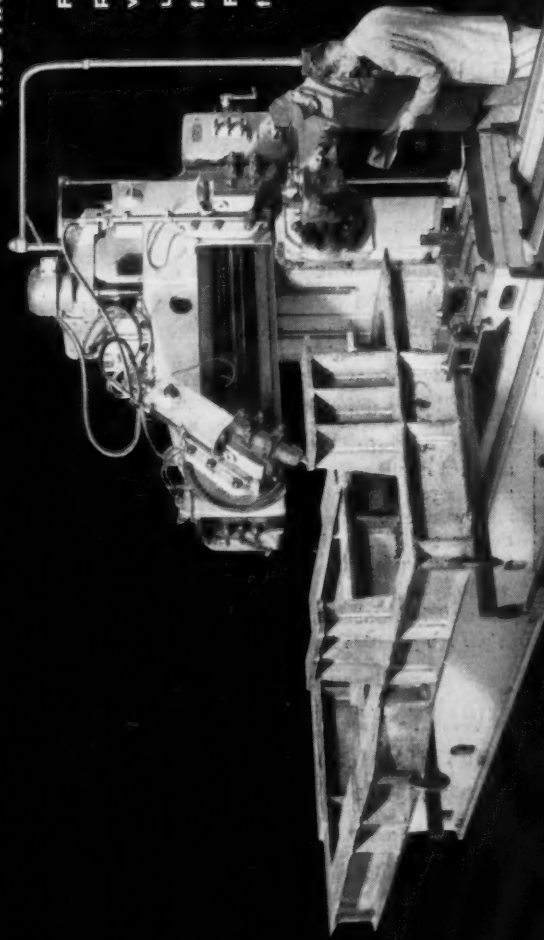
Why not find out if your tap costs are as low as they can be? It costs nothing to consult HY-PRO specialists. For complete details, write Dept. G

ASK FOR STOCK LIST OF SPECIAL TAPS
AVAILABLE FOR IMMEDIATE DELIVERY

THIS HANGOVER IS NOT A HEADACHE!

Pottstown Machine Company
planes large, awkward
weldment easily and quickly,
using ruggedness and
flexibility of

ROCKFORD HY-DRAULIC PLANER
for fast, accurate machining



ROCKFORD MACHINE TOOL CO. 2800 KISHWAUKEE STREET ROCKFORD, ILLINOIS

HY-DRAULIC

For more data circle 358 on Postpaid Card

All-New Precision Stewart-Warner PORTABLE BALANCER

Engineered for precision balancing of all rotating machinery. 1. Stroboscope and meters mounted in same portable head for easy one-man operation. 2. Removable, lightweight electronic unit for easier balancing in confined spaces. 3. Electro-magnetic pickup can be placed on machine part, freeing operator's hands.



cuts maintenance costs by enabling you to eliminate even smallest vibrations!

Stewart-Warner's new portable balancer is priced to make it economical for even small shops to own their own balancing equipment. Its portability permits easy *in-place* balancing and vibration analysis of assembled machinery. Indicates angle and amount of unbalance . . . determines rpm and amount of vibration. Helps produce finer finishes and closer tolerances . . . aids in reducing noise and worker fatigue . . . permits quality control before equipment is put in operation or shipped to a customer.

Also: a complete line of permanently installed cradle type balancers to meet every job type or short run precision balancing requirement.

**Write
for
free
catalogs!**



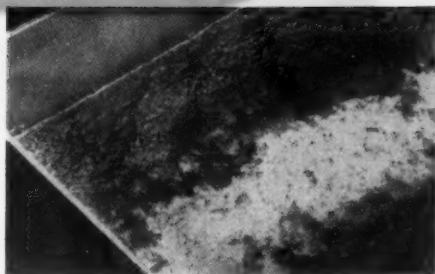
STEWART-WARNER CORPORATION INDUSTRIAL BALANCER DEPARTMENT

Dept. YY-39, 1830 Diversey Parkway, Chicago 14, Ill.

For more data circle 359 on Postpaid Card

Many
nate c
oil em
throug
Their
corros
damag
million
Now,
Elcide
inhibi
well-p
these i
in sur
contro
comm
Elcide
evalua
plants.





Coolant sumps are breeding grounds for harmful bacteria. Laboratory analyses have found up to 3 billion bacteria per ml. in coolant only a few days old.

NOW, a simple, safe treatment with Elcide 75 keeps the bacteria count down, increases the life of standard duty soluble oil emulsions.



Bacteria Control: A new way to beat rising production costs

Many harmful types of bacteria contaminate coolant sumps and help destroy soluble oil emulsions. These bacteria enter emulsions through the air, water, and plant debris. Their build-up in the coolant causes odor, corrosion, and emulsion breakdown. Their damage costs the metalworking industry millions of dollars each year.

Now, this damage can be stopped with Elcide 75. Elcide 75 is a new bacterial inhibitor composed of two separate, but well-proven, anti-bacterial agents. One of these is related to a material popularly used in surgical practice. This powerful action controls a wider range of bacteria than the commonly used germicides.

Elcide 75 has been carefully tested and evaluated by several large metalworking plants. Added to fresh emulsions at the rate

of one ounce per each four gallons of emulsion, plant researchers found its double control increased emulsion life up to 5½ times longer than untreated emulsions.

Extended emulsion life starts a chain reaction of decreased production costs. Less oil concentrate is needed to do the same job. The man-hours spent servicing machines and disposing of waste oil are greatly reduced. Production increases because machines run longer between emulsion changes. Additional benefits include reduced corrosion of tools and products, and elimination of rancid odors.

Try Elcide 75 in your plant and total up your savings. You'll be pleasantly surprised to find out just how important bacteria control is to good plant management.



ELCIDE 75TM
PATENT PENDING

KEEPS COOLANTS FRESH AS A DAISY!

ELCIDE 75: SPECIFICATIONS

(Lilly's brand of bacterial inhibitor for cutting fluids)

Active Ingredients—Sodium Ethylmercuri Thiosalicylate (Thimerosal) and Sodium o-phenylphenate.

Package	Price per Gal.
1 gal. (4 per case), polyethylene	\$8.50
5-gallon, polyethylene	\$8.00
55-gallon, stainless steel.	\$6.50

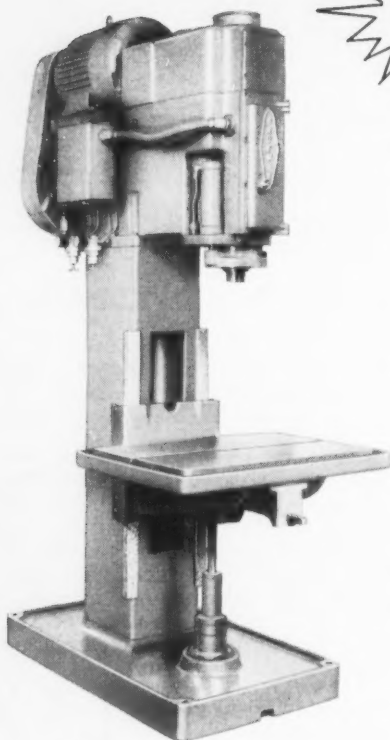
Sold only through selected distributors. For more information or to place your order, phone or write:

ELI *Lilly* AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION • INDIANAPOLIS 6, INDIANA
For more data circle 360 on Postpaid Card

FOR HIGH SPEED PRECISION TAPPING CHOOSE THE

KAUFMAN

MODEL 10E-20



Six features of this new, precision-built Kaufman Tapping Machine are:

1. Lead screw control for accurate threads and maximum tool life. Maximum $4\frac{1}{2}$ " lead screw travel.
2. Rapid approach of spindles to work.
3. Clutch operated for faster operation — Reversing spindles at twice forward speed.
4. Six speed transmission providing spindle speeds of 80-350 RPM with 3-1 ratio or 160-700 with $1\frac{1}{2}$ -1 ratio clutch.
5. Units provided with 5-7 $\frac{1}{2}$ -10 H.P. Motors.
6. Speeds and H.P. available for highly efficient tapping from $\frac{1}{16}$ " through 2" NC taps or smaller taps with use of multiple head.



For additional information about the new Model 10E-20 or other Kaufman machines for single or multiple operation, write or telephone:

KAUFMAN MFG. CO.

551 S. 29th Street.

Manitowoc, Wisconsin

For more data circle 361 on Postpaid Card

*The hardest metal parts
are easiest to finish*

...when you use NORBIDE* abrasive

Extra hardness, one of the most useful qualities of the new metal alloys, is also one of the most powerful challenges to adequate finishing.

NORBIDE boron carbide abrasive meets that challenge with its own extra hardness. Of all commercial abrasives, this Norton development is second only to diamonds in hardness. And although diamond dust costs several hundred times as much, NORBIDE grain has exceptional cutting action. That's why it is an outstanding cost-saver on many metalworking jobs.

See your Norton Distributor for details on how NORBIDE abrasive can improve quality and cut costs in your production. Or write to NORTON COMPANY, 49 New Bond St., Worcester 6, Massachusetts.

*Trade-Mark Reg. U.S. Pat. Off.
and Foreign Countries



Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals

BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

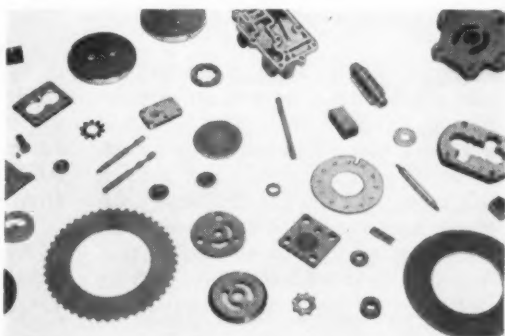
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March, 1959

modern machine shop 63

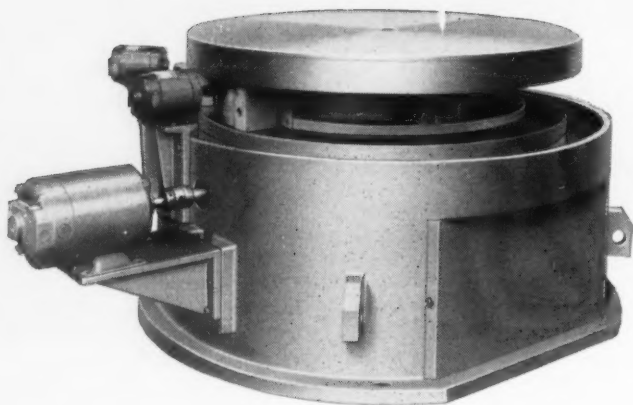


In Ultrasonic Impact Grinding, machines generate vibrations of 25,000 cycles per second, and drive abrasive against the work with a force of 150,000 times the abrasive's weight. The two leading manufacturers of these machines recommend NORBIDE abrasive grain for most applications. Workpieces shown are of such alloys as Stellite, Rexalloy and Alnico. For impact grinding hard or brittle materials, NORBIDE grain is unequalled for high precision and long service. (Photo courtesy Raytheon Manufacturing Co.)



In Lapping, NORBIDE abrasive is the ideal cutting agent in many compounds, giving excellent results without heat, vibration or thermal shock. And the resistance of NORBIDE grain to fracturing and splintering avoids the tiniest scratches on all work, including the new alloy parts shown.

G-358



drill varied hole patterns without changing set-up

If your drilling, tapping, or milling jobs require even, uneven, or skip indexing, this new Electrode table will give you more flexibility than ever.

Set up your work piece just once on this table, and you can drill many different hole patterns. Changeover from one index pattern to another is fast. You can do it mechanically—with index rings or inexpensive templates—

or by push-button electrical counting.

Eight-channel numerical tape control is available. You get indexing accuracy to $\pm .001$ " at a 45" diameter. And you can choose your table size from 30", 45", 60", and 80" diameters.

Bulletin 258 gives complete details.

Avey Division, The Motch & Merryweather Machinery Co., Box No. 1264, Cincinnati 1, Ohio.



For more data circle 363 on Postpaid Card

LOOK for safeguards in industrial handcleaners



SOOTHING LANOLIN

A rich lanolin content in West LAN-O-KLEEN Handcleaner combats the depletion of natural skin oils during washing. It has a retarding effect on the defatting action of soap. As determined by laboratory tests. And confirmed by years of industrial use.

The lanolin in LAN-O-KLEEN is not milled into the soap by conventional methods. It is impregnated into a corn meal base by an exclusive process. In this way a higher content is achieved. But more important, the emollient is "free" lanolin. By being "free" its soothing and softening action is more positive and beneficial.

LAN-O-KLEEN offers still further advantages. Its corn meal base gently soaks up potential skin irritants with a soft, sponge-like action. A balanced combination of soaps provides high sudsing without excessive hand

rubbing. Each pound bulks up to 50% more than most powdered soaps—and lowers costs with proportionately more washings.

FREE TRIAL OFFER. We'd be glad to supply a dispenser and five pounds of LAN-O-KLEEN for free trial. Or if you prefer, we'll send a sample for evaluation. Just call your nearby West office. Or mail the coupon below to our Long Island City headquarters, Dept. 16.

- ☐ Supply trial dispenser and 5 lbs. of LAN-O-KLEEN.
- ☐ Send a packet of LAN-O-KLEEN for evaluation.

Name

Position

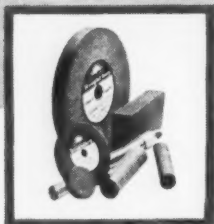
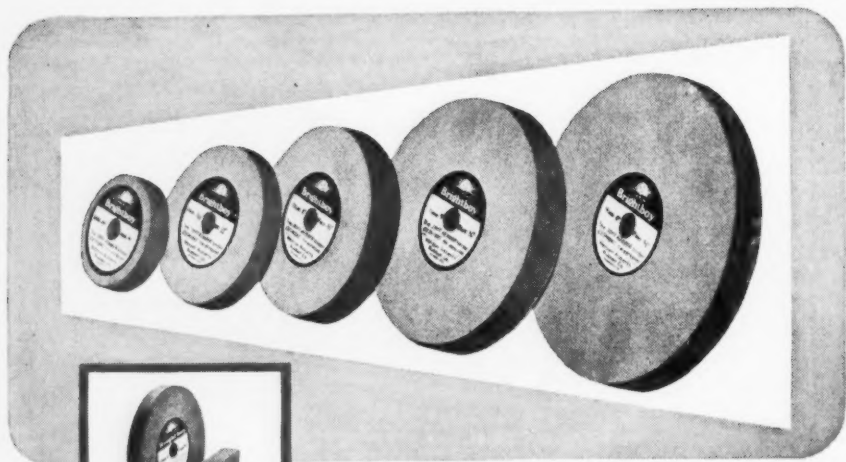
PROGRAMS AND SPECIALTIES
FOR PROTECTIVE SANITATION
AND PREVENTIVE MAINTENANCE



WEST DISINFECTING DIVISION

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WEST CHEMICAL PRODUCTS INC.
42-16 West St., Long Island City 1, N. Y.
Branches in principal cities
CANADA: 5621-23 Casgrain Ave., Montreal



MODERN BRIGHTBOY ABRASIVES

Replace older, costlier metalworking methods

Looking for cost savings? Improved product-quality? Simpler, faster production procedures? The many applications of Brightboy, the different finishing medium, will give you a broad, refreshing concept of metal working not usually associated with the scope of abrasives.

REASON: Brightboy's compound—abrasive and rubber, working together in a unique action. Brightboy **BURRS, CLEANS, FINISHES, POLISHES**, in a single-step, time saving operation, frequently producing the final polish. Special surface effects, damaskeening,

for instance, also can be achieved. *No fuss, no muss!*

Readily-available Brightboy **STOCK** numbers are **JOB-MATCHED** to your work to eliminate your need for special compounds. You have wide choice in Silicon Carbide and Aluminum Oxide grains, grades extra fine to extra coarse, in soft, firm and tough rubber binders. Wheels, sticks, rods and blocks for machine and manual operations.

Write Us NOW for:

- **SAMPLE BRIGHTBOY HAND TABLET**
- **CATALOG LISTING**
GRAINS, TEXTURES, MACHINE SPEEDS
- **NEW METHOD RECOMMENDATIONS** and name of nearest Brightboy distributor

TIME SAVING FEATURES

Works to close tolerances
Can be shaped to contour
Produces conventional and special finishes and patterns, frequently the final polish
No before-use preparation or dressing
No skilled labor required

GENERAL USES

Removing light digs, tool and heat marks
Cleaning welded and soldered joints
Burring and finishing castings, stampings, machined and molded parts
Maintenance of tools and machinery



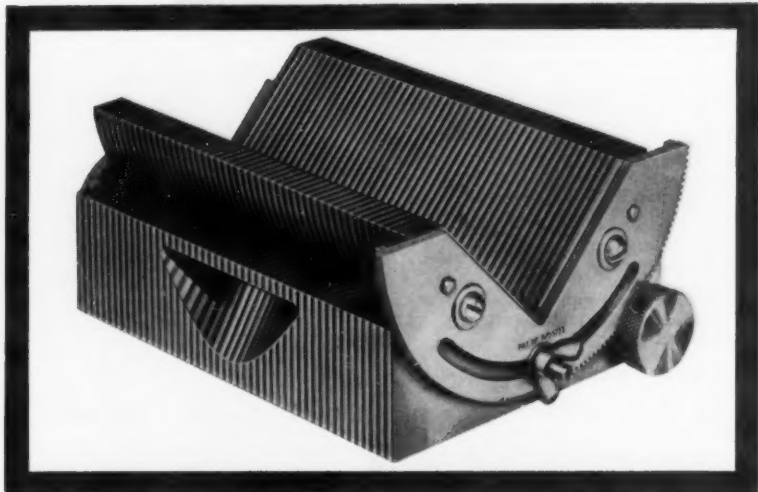
BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.

*America's Pioneer Manufacturer
of Rubber-Bonded Abrasives*

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precision setup for precision grinding



with the new

ANTON MAGNETIC ADJUSTABLE V-BLOCK

This unique precision workholder permits quick and accurate setups, saving time, effort and money in grinding operations.

Laminations are held without pins or rivets and cannot shift, and a laminated insert is furnished FREE for larger, flat work. The Anton Adjustable V-Block can also be used on drill presses or other machines equipped with magnetic chucks.

Compare these distinctive features:

- Parallelism: $\pm .00005''$ over entire length
- Maximum setting: 90° angle
- Vernier accuracy: ± 15 seconds
- Size: 6" long, $4\frac{1}{2}''$ wide, $2\frac{1}{2}''$ high
- Unsurpassed for layout, toolroom and production

Anton

Write today for complete technical data to:

Machine Works

1226 Flushing Avenue, Brooklyn 37, New York

Standard & Magnetic Parallels • Standard & Adjustable V-Blocks • Diamond Holders • Milled Blanks

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March, 1959

modern machine shop 67

AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS

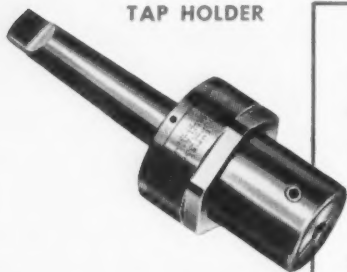
Check These Exclusive Empire Floating Tool Holder Features:

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

TOOL HOLDER



TAP HOLDER



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

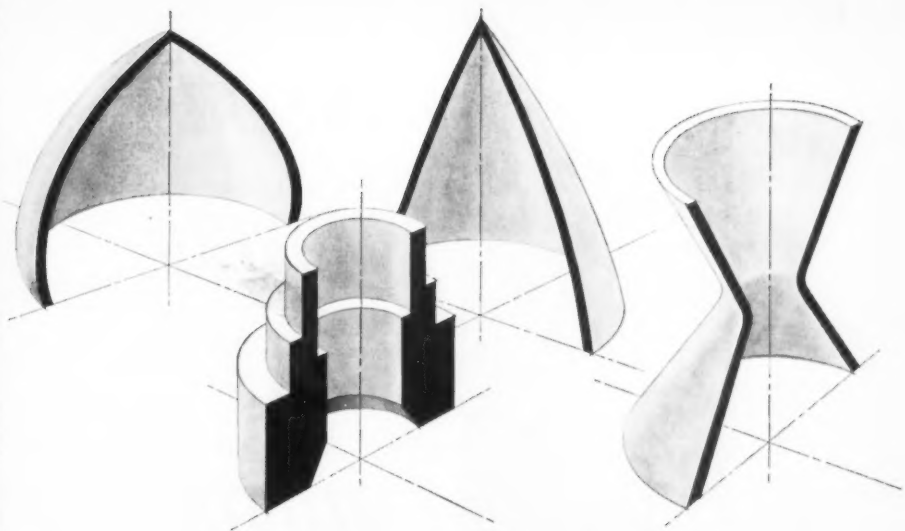
Check These Exclusive Empire Floating Tap Holder Features:

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

EMPIRE TOOL COMPANY

11503 LAMBS ROAD • MEMPHIS, MICHIGAN

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how to Vertical Grind missile shapes

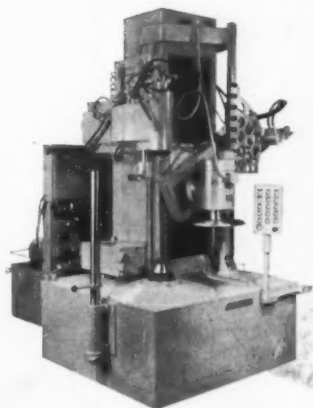
Complex missile shapes such as these, weighing hundreds or thousands of pounds, can be ground accurately on a Springfield vertical contour grinder. These machines are equally at home grinding ceramics, plastics, metals or combinations of materials. Domes (1) of any shape or Cones (2) demanding extreme concentricity can be contour ground on a Springfield. Ceramic coated parts (3) or complex orifices (4) are naturals for grinding on a standard Springfield vertical.

If your missile shapes, *no matter what size*, require contour grinding or have taper holes, irregular holes, offsets, undercuts or angles—we'd like to show you how the Springfield principle of vertical grinding can work for you. Mail the coupon today, for your free and informative copy of "Vertical Universal Grinders"; Bulletin 197-E.

THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO

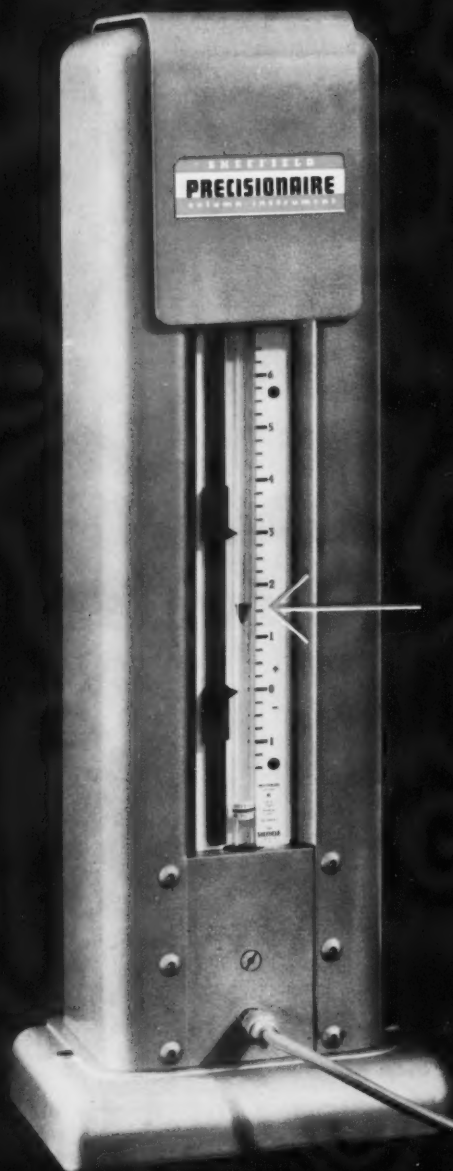


SPRINGFIELD



This machine accurately grinds a compound-curve dome. Both the grinding wheel and a single point tool follow a precision template. Automatic parting tools remove excess stock, top and bottom.

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***THE ONLY
MOVING
PART
FLOATS
ON AIR***

Precisionaire®: the gage that always works.

*The
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Of t
man*

Precis.
Amplifi
the gla
immun
justme
pneuma
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Scale is
A Preci
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The Sheffield Precisionaire® gage is the most accurate, most dependable, most widely accepted air gage money can buy. Here's proof:

There are more Precisionaires in use than all other air gages combined.

Of the nation's 500 largest companies, every one engaged in precision manufacturing uses Sheffield. Only Sheffield offers these advantages:

Precision built into instrument

Amplification and linearity are built into the glass float tube permanently—immune to "hidden drift" and misadjustment. Amplification is entirely pneumatic, linear over the full 8" scale, even for dimensions smaller than .185". Scale is the longest available anywhere. A Precisionaire is ready to go without warm-up.

Choose and change amplification

Only Sheffield lets you select the amplification you need from 50:1 through 100,000:1 or greater. When your requirements change, you convert to another standard amplification in 2 minutes with an inexpensive kit. A Precisionaire stays new.

Maintenance-free—always

The only moving part—the float—is suspended in a column of filtered air. This illustrates the design simplicity,

inherent proof that a Precisionaire never wears out. You can depend on accurate, repeatable dimensional readings day-after-day, year-after-year no matter how often your requirements change.

Choose gaging elements you need

Only from Sheffield can you select the exact size sensing element you need from the broadest inventoried line available. Your complete Sheffield gaging system carries a single nameplate guarantee and is backed by a coast-to-coast network of gaging centers.

Unskilled people read it faster

Simple two-master setting is **always** reliable and is the only **proven** way to compensate for every operating variable. Tolerance display is as great as desired. Bold, clear markings read directly in fractions of an inch, without parallax. Gage response is virtually instantaneous even when the part is remotely located. You check multiple

dimensions with one quick eye-sweep over compactly grouped columns. Computing circuits eliminate "figuring" on complex multiple checking.

Sheffield knows air gaging

During 18 years of leadership, Sheffield has simplified, refined and polished air gage design for maximum accuracy and reliability. A reason you can depend on Sheffield recommendations is that Sheffield makes **every** type of dimensional indicating gage—pneumatic, electronic, electric and optical-mechanical. Your needs **alone** form the basis of a proposal.

Write for catalog

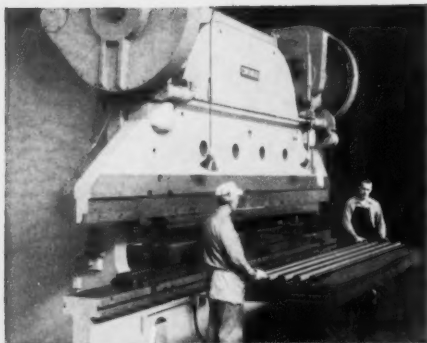
Find out now about the dollar advantages of Sheffield air gaging systems. Contact your Sheffield gage engineer through your Yellow Pages, or write direct for Catalog No. AGS-1-59

THE SHEFFIELD CORPORATION
Dayton 1, Ohio, U.S.A. CL 4-5377

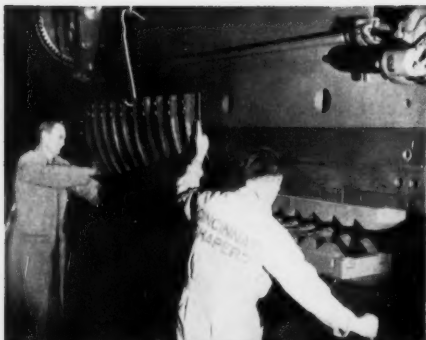
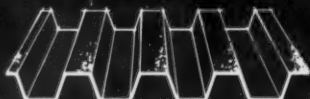


the **SHEFFIELD** *Corporation*
of Bendix Aviation
manufacture and measurement for mankind

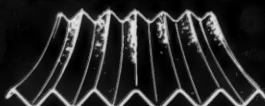
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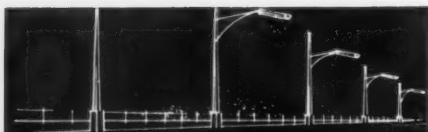
Forming bridge flooring and guard rails



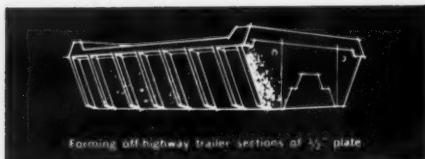
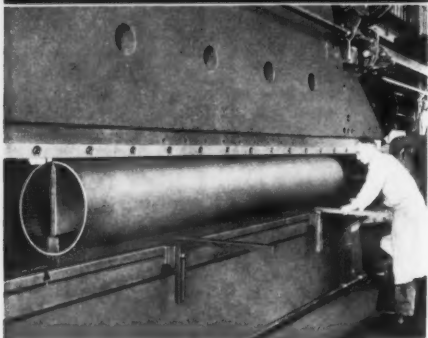
Forming culvert sections which have been punched and corrugated



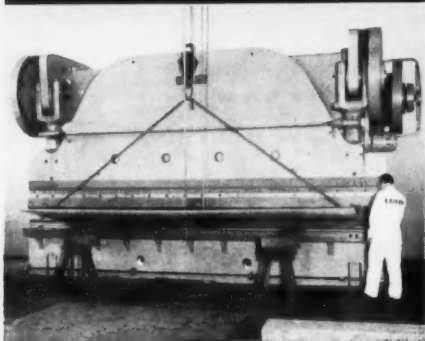
Tool up with Cincinnati® for

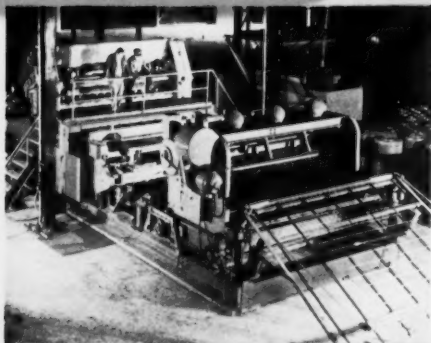


Forming pipes, tubes, and posts up to 30' long

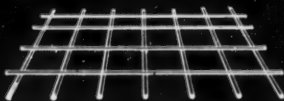


Forming off-highway trailer sections of 5/8" plate





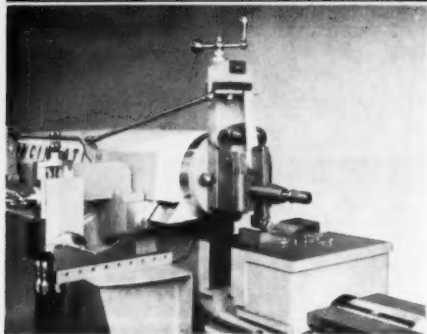
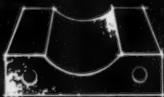
Automatically shearing welded steel road mesh



Embossing road signs

America's huge road program

Shaping bridge pillow blocks quickly, accurately



Here are just a few of the many jobs now being done profitably on Cincinnati® Shears, Press Brakes, and Shapers—helping to build America's highways.

Your share of the profits from this vast highway program will depend on your ability to supply metal components on time, in sufficient volume, to specifications, and at competitive prices. Whether you make guard rails or bridges, lampposts or culverts, curb forms or earthmovers—now is the time to measure your shear, press brake, and shaper capacity against the demand coming down the road.

Don't wait for competitive traffic. Write Department U for more data on these Cincinnati applications: Catalog B-5 on Press Brakes; Catalog S-7R on Shears; Catalog N-7 on Shapers.

Shapers / Shears / Press Brakes

THE **CINCINNATI**
SHAPER co.



Cincinnati 11, Ohio, U.S.A.
For more data circle 373 on Postpaid Card

PRECISION BORING



with
no
rejects

SAVE 300 HOURS PER UNIT

on precision boring of gear boxes. Each unit (2 halves) calls for over 200 holes, averaging 4 operations per hole and 3 setups per unit. Boring, spot facing, recessing, milling, tapping and counter boring. Material is magnesium alloy. Location tolerances $\pm .0001$.

hole location accurate to $\pm .0001$ "

hole sizes repeated to $\pm .0001$ "

Boring time reduced from 800 hours to 500 hours per unit—with no rejects in all 50 parts—and every one accurate to $\pm .0001$ " on hole size and location!

Mr. R. Schmidt of Triangle Tool Co., Union, N. J., owner of this Fosmatic Jig Borer, reports, "Two Fosmatic features were largely responsible for this important time saving. First, the Fosmatic's long table travel permitted machining two parts at once. Second, the automatic positioning and Direct Dimension Measuring System work simply and fast. They eliminate confusion and help the operator work accurately and efficiently. Incidentally, that long table travel helped get us several new jobs we could never have handled on our other jig borer."

With Direct Dimension Measuring the operator sets dimensions direct from blueprint onto two direct reading drum dials. At the press of a button, the table automatically positions work to $\pm .0001$ ".

Fosmatic Jig Borers bring you many important advances in boring technology. Where progress has been so great, the obsolescence of your old machine may be more costly than you suspect. *Why not run a check?* Call your Fosdick Distributor or write us today.

Buy a Fosmatic today—add Numerical Control Tomorrow

Any tape or card reader can be used to control a Fosmatic. And because the functions of our machine are actuated electrically, numerical control can be installed in the field—economically. You can program all or as many functions as you wish! Write or call today for complete information.

Ask for Fosmatic Jig Borer Bulletin JB-A

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Job Facts:

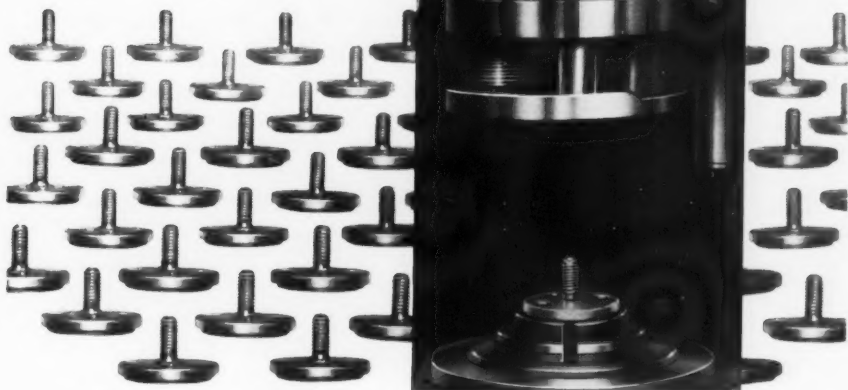
Existing equipment: #2 Snow vertical drilling machine

Part: mounting base for power transistor

Material: electrolytic tough pitch copper

Thread: 10-32

Production: 1000 parts per hour

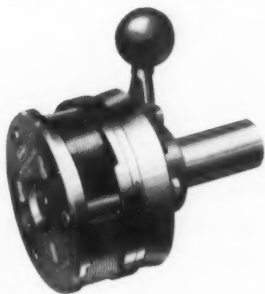


ONE Acme-Fette Thread Rolling Head
Thread Rolls 5,000,000 Pieces
without major investment

"A standard thread rolling machine would cost from seven to eight times more money than is invested in our Acme-Fette Thread Rolling Head and the existing equipment on which it is installed", says H. M. Oshry, Vice President of Steel Industries, Inc., Crawfordsville, Indiana.

The extremely rugged head achieved this outstanding production record with only three sets of thread rolls, producing threads with consistently closer tolerance and uniformity. A higher tensile strength is also obtained, and the resulting surface hardening provides a surface quality not achieved by any thread cutting method.

Acme-Fette Heads roll all parallel thread forms from $\frac{1}{16}$ " to 2" at speeds equal to turning speeds with high speed tools . . . up to 5 times faster than conventional thread cutting. For cost reducing ideas showing how you can put these heads to work on your *present* equipment, send for Bulletin NAF-57A.



**National
Acme**

The National
Acme Company
183 E. 131st Street
Cleveland 8, Ohio

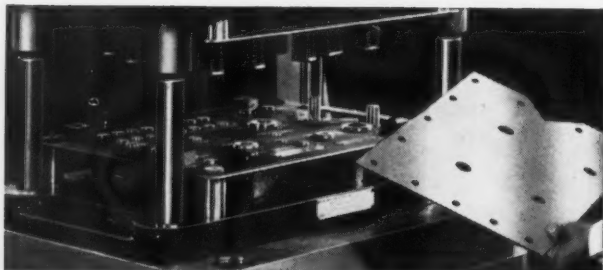
Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

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March, 1959

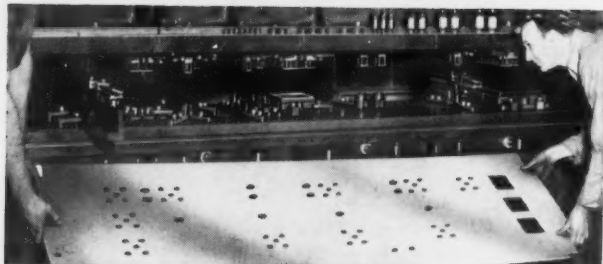
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OVER 2700 PLANTS are saving money with WHISTLER DIES



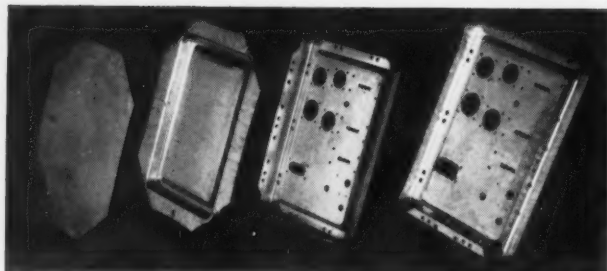
MAGNETIC PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.



ADJUSTABLE PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.



manufacturer
of all types of
CUSTOM DIES
for over 40 years

WRITE FOR
COMPLETE DETAILS

S. B. WHISTLER & SONS, INC., 740 Military Rd., Buffalo 23, N. Y.

Mail the following: ☐ Magna-Die Catalog ☐ Adjustable Die Catalog
☐ More information on custom die work

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____



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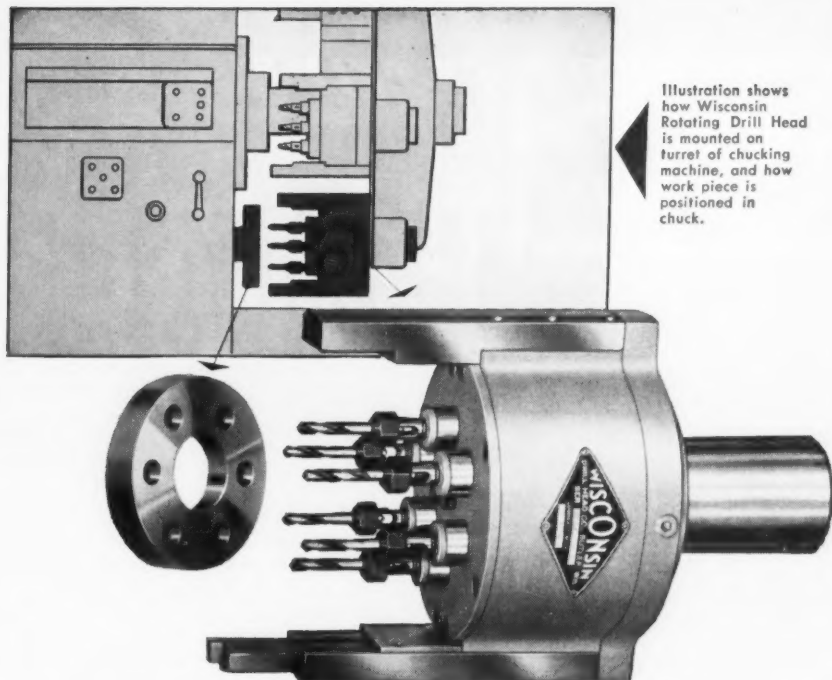
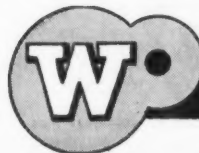


Illustration shows how Wisconsin Rotating Drill Head is mounted on turret of chucking machine, and how work piece is positioned in chuck.

WISCONSIN Rotating Heads for your Automatic Chucking Machines

Rotating Drill Heads and Tapping Heads by Wisconsin are winning wide favor because of their efficient performance on popular makes of automatic chucking machines and lathes. If you have a drilling or tapping operation to perform at low cost, consider the application of one or more of these heads specially engineered to your specifications. The Wisconsin engineering staff is qualified by training and experience to assist you in tooling for high speed, low-cost production. Send your "specs" and prints for quotation.

CONSULT OUR FIELD ENGINEERS OR WRITE —



WISCONSIN DRILL HEAD CO.

4938 NORTH 124TH STREET • BUTLER, WISCONSIN

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A8-9447-1/21

March, 1959

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BRYANT**EX-CELL-O**

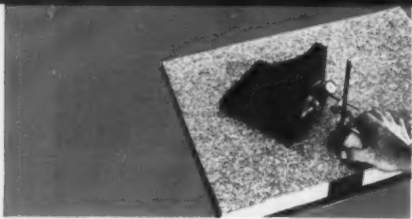
TEAMED UP

TO BETTER SERVE YOUR PRECISION NEEDS



BRYANT B-21 BENCH GAGE EXACT READINGS 8 TO 10 TIMES FASTER CHECKING INTERNAL AND EXTERNAL THREADS

Now, two famous names team up to fill all your thread, groove and bore gaging needs! The Bryant B-21 Bench Gage, one of many versatile gages now available from Ex-Cell-O, checks all threads, all forms and classes up to 5". Attachments and accessories permit a wide variety of uses, including checking squareness of face and concentricity of diameters, and checking parts with standard snap-ring or "O"-ring grooves or special grooves.



59-B-11

BRYANT GRANITE SURFACE PLATES

UTMOST PRECISION OF SURFACE—
UNEXCELLED WEAR RESISTANCE

Only true granite, with Bryant-patented "head of the grain" finishing, provides surface-wide hardness and homogeneity. Standard and special sizes. Modern welded steel stands available for all plates.



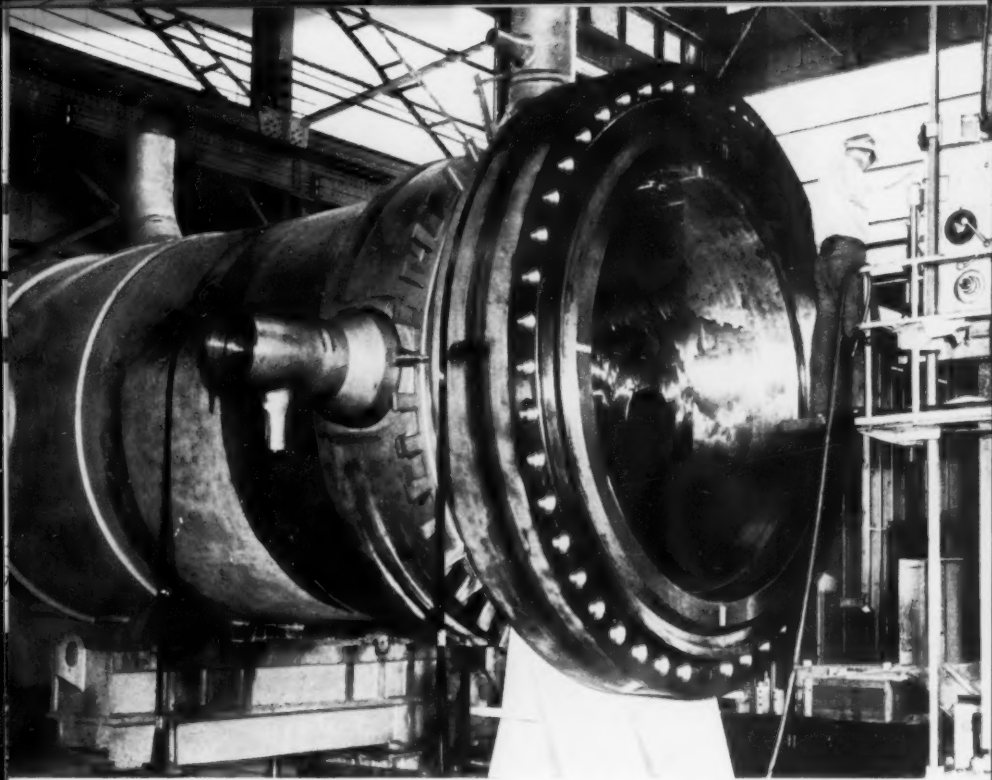
FREE FACT-FOLDERS—Everything you'll want to know about the full line of Bryant Internal and External Thread and Groove Gages. Also—the full story of how Bryant Granite Surface Plates can make a big difference in your layout, inspection and assembly work. Read the results of unbiased wear-tests of nearly 30 different surface plates!

EX-CELL-O FOR PRECISION
CORPORATION 

GREENVILLE PLANT, 945 E. SATER ST., GREENVILLE, OHIO

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • THREAD AND GROOVE GAGES • GRANITE SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

For more data circle 378 on Postpaid Card



Courtesy Combustion Engineering, Inc.

Combustion Engineering specified more than "ordinary boring mills"

Combustion Engineering, Inc., pioneer manufacturer of heavy reactor vessels, concluded that ordinary boring mills would not produce the close tolerances and surface finish required in their critical operations. That is why they specified a Cincinnati Gilbert floor type boring mill for this job.

The workpiece is a 96-ton stainless steel reactor for a Naval nuclear power plant. The Gilbert machine is used to finish the boring of the bolt holes in the 20" thick flange, and to machine the outlet nozzles.

Combustion Engineering's high standards require

a surface finish of 32 R.M.S. on some of the bolt holes—an easy specification for a Gilbert, which can bore holes with a mirror finish, when required. A Tele-Vernier optical measuring system increases the speed and accuracy of machine positioning.

Work of equally high quality is produced on a number of other Gilbert boring mills at Combustion Engineering's Chattanooga and Windsor plants—proof that "those who buy Gilbert buy Gilbert again."

Write for new Bulletin 558.

The Cincinnati Gilbert Machine Tool Co., 3348 Beekman Street, Cincinnati 23, Ohio.

those who buy **GILBERT** *buy Gilbert again*

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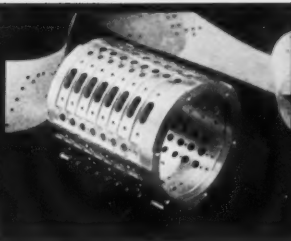
March, 1959

modern machine shop 79

ACCURACY



MACHINING TIME WAS CUT 50% for 10-piece lots of these gear boxes, by changing from manual to tape control. Locations made automatically under tape control are accurate to .0001".



30-HOUR JOB DONE IN 7½, when this precision computer part was machined under Numerical Control. This job involved precision machining at 566 separate locations.



1429 HOLES WITHOUT ERROR, an almost impossible job under manual operation, was completed under Pratt & Whitney Numerical Control with estimated time savings of 41%.

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ASSURED...

"P&W NUMERICAL CONTROL HAS PROVED IT WILL IMPROVE MACHINE UTILIZATION* 100% AND ELIMINATE ERRORS," says "Jake" Jaeger

**(Time spent cutting metal)*

Mr. J. J. ("Jake") Jaeger, Vice President and Chief Engineer of Pratt & Whitney's Machine Tool Division, states, "Reports from more than 35 successful installations in the field and experience in our own manufacturing conclusively prove that P&W Jig Boreers with Numerical Control represent a truly significant advance in metalworking. Users, which include both the giant corporations and shops with less than 10 men, are realizing time savings from 2-to-1 to 6-to-1 — depending on the complexity of the parts — and in addition have improved their MACHINE UTILIZATION time 100%. With this great increase in productivity, the jig borer has truly become a production machine. Used, for example, in our own manufacturing of components, the need for expensive jigs is eliminated, engineering changes are simple and inexpensive — and every production part has the toolroom precision of an original jig.

ADDITIONAL ECONOMIES THROUGH SCRAP ELIMINATION . . .

"With all machine positioning made automatically under Numerical Control, scrap losses from human errors in positioning are eliminated. Freed from blueprint

calculating, the operator can concentrate on his primary job — making chips. The result is more and better work, with less fatigue.

VERSATILITY UNLIMITED

"The P&W Jig Borer has also proved that it can handle efficiently and economically an almost unlimited variety of jobs — one-piece jobs, extremely complex jobs, or lot production — in fact, any job that requires drilling, reaming, tapping or boring holes, or milling slots or surfaces."

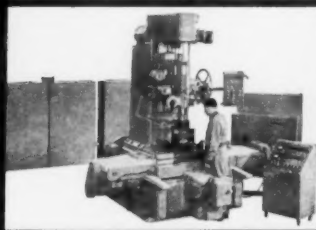
Summing up the importance of Numerical Control, "Jake" Jaeger continues, "No one can afford to overlook the ability of this equipment to increase machine tool utilization and effect economies in his own operations." Experience has proved the truth of this statement, so act today to get all the facts on P&W Numerical Control. Write now for your free copy of Circular No. 609. Pratt & Whitney Company, Inc., 29 Charter Oak Boulevard, West Hartford, Conn.



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

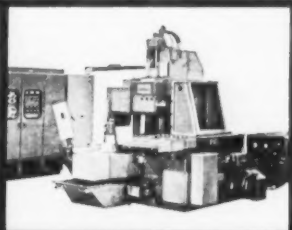
MACHINE TOOLS • GAGES • CUTTING TOOLS



AUTOMATICALLY POSITIONING WORK ACCURATE TO .0001", the P&W Numerically Controlled Jig Borer combines toolroom precision with production-line speed and economy.



SETTINGS ACCURATE TO 5 SECONDS OF ARC are made automatically by the P&W Rotary Table with Numerical Control. Automatic positioning speeds work, eliminates human errors.



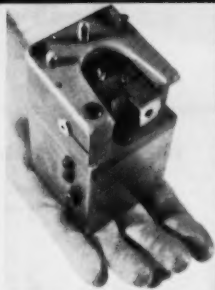
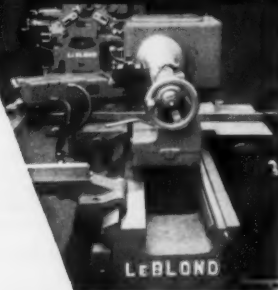
PROFILE MILLING ENTIRELY UNDER TAPE CONTROL, the P&W Numerical-Keller produces irregular shapes without the need for any template or model. Accuracy is unusually high.

For more data circle 380 on Postpaid Card

New Tracer? Yes!

SIMPLICITY ITSELF! All parts mount on lathe, need no extra floor space. Set up takes less than 15 minutes. Short hoses are located out of operator's way.

LOCKED-CIRCUIT VALVE is secret of responsive operation. Precision plunger fits to .0001". Valve maintains constant accuracy, does not heat up in operation.



COM
man
with
oil r

All new* from LeBlond

REGAL-TRACE

**New principle, new design, new convenience, new price—as low as \$2760!*

Now, a completely new tracer unit designed exclusively for famous LeBlond Regals and Dual Drives. Regal-Trace! Engineered from the start for convenience, compactness, responsiveness, precision and economy. LeBlond quality throughout — and new low prices beginning at \$2760 (for 13" Regal model).

Easy to use — Traces radii, stepped shafts, contour faces, tapers, compound and spherical curves. Swivels 45° either side of perpendicular to the work. Cuts toward or away from headstock. Uses easily prepared flat templates.

Self-Contained — Only 4 major parts: tracer unit, power unit, template carrier and bed bracket assembly. All parts, including compact hydraulic system mount on lathe. No extra floor space required. Tracer unit replaces compound rest, can be installed and operating (or removed) in less than 15 minutes. No reduction whatever in swing capacity. Permanently rear-mounted hydraulic unit becomes integral part of machine, does not interfere with normal lathe operation.

Accurate, smooth, fast — Locked-circuit hydraulic system delivers a new degree of responsiveness and precision. Stylus pressure less than one pound. Will consistently reproduce parts to accuracy of $\pm .0005"$. Pressure is maintained at 300 psi (or higher if desired). Hydraulic cylinder provides feed rate of 75 in. per minute. Unique valve unit is preset at factory, requires no adjustment.

Fits any LeBlond Regal built since 1955 and all Dual Drives. Can be installed in the field or purchased as original equipment on new lathes. Write today for complete information and specifications on the all-new LeBlond Regal-Trace or see your LeBlond Distributor.

For more data circle 381 on Postpaid Card



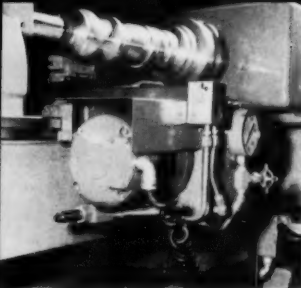
...cut with confidence

**The R. K. LeBlond
Machine Tool Co.**
Cincinnati 8, Ohio

*World's Largest Builder
of a Complete Line
of Lathes for More
Than 72 Years*

COMPACT HYDRAULIC UNIT mounts permanently at rear, does not interfere with normal lathe operation. Includes oil reservoir, pump, motor, relief valve.

EASILY PREPARED flat templates mount conveniently at front of lathe, are easily stored between jobs. Straight template or straight edge used for turning tapers.



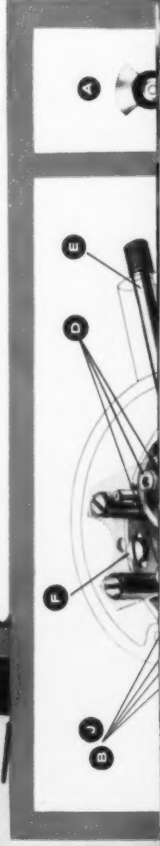
You get all these

Plus Features

only in

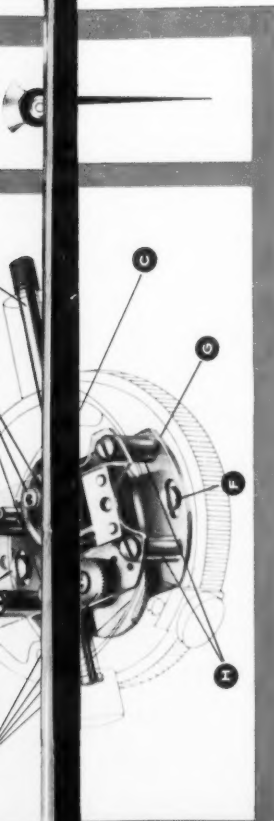
Federal Indicators

Full Jeweled Bearings, Unit Movement, Low Inertia Indicating Hand, Tough-Hardened Gears — each of these advancements pioneered by Federal has a particular significance to you in terms of better performance. AND with all these *plus* features, Federal Dial Indicators generally sell for LESS due to their wide acceptance which has made possible the economies of quantity production. Here are the features and reasons why they are important:



FEDERAL
FACTS CORPORATION
ICE, R.I. U.S.A.

005"



- A Functionally designed Indicating Hand** balanced for low inertia, provides greater sensitivity and better repeat accuracy. Hand has highest strength-to-mass ratio to preserve position and shape under heavy gaging action.
- B Precision-made, Stainless Steel Gears, Rack and Pinion**, for a rustproof, smoother running, more accurate movement.
- C Positive Contact** with minimum pressure for faithful indicator response.
- D Full Jeweled Bearings** reduce friction, for improved accuracy over a longer period of time.
- E Precision Fit** of spindle and bearing for better repeat accuracy.
- F Accurate Movement Positioning** for optimum rack and gear alignment. Provides extremely close and positive control over a critical fit in every indicator.
- G Unit Construction** for easy maintenance and adjustment.
- H Rigid Assembly** of top and bottom plates for accurate gear alignment essential to minimum wear.
- J Tough-Hardened Gears** available optionally on most models for greatly increased life, reduced friction and improved sensitivity.

Ask for your copy of Catalog 58. It describes the full line of Federal Dial Indicators — the world's most extensive line.

FEDERAL PRODUCTS CORPORATION • 9143 Eddy Street • Providence 1, R. I.

Ask **FEDERAL** *First*

for recommendations in modern gages . . .

Dial Indicating • Air • Electric, or Electronic — for inspecting, measuring, sorting, or automation Gaging

For more data circle 382 on Postpaid Card

INGENIOUS NEW... UNIVERSAL R&R DEBURRING TOOL



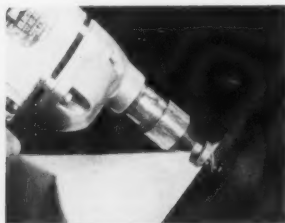
with spring loaded retractable blade
eliminates chatter
gives precision-cut edge or
chamfer at high speed



The cutting action of Model 955 Universal R&R chatterless Deburring Tool (on the left) is effected by spring tension against the blade. On Model 956, right, the spring tension is against the body. This is adjustable to regulate the depth of cut. The blade is free-floating to allow self-alignment and uniform stock removal.



The new Universal R&R Tool makes a handy horizontal deburrer when used with a portable drill held in a vise. With proper adjustment, the R&R Deburring Tool is CHATTERLESS. A new design allows the bearing angle of the tool body and the blade to be in continuous contact with the work piece at all times.



R&R Deburring Tool used in electric drill as a portable unit for heavy plate or other objects too heavy to handle. Blades of the R&R Deburring Tool are replaceable at nominal cost from stock. They are made of high speed steel, precision hardened and ground to close tolerances for interchangeability.



Used in any standard drill press at the high operating speeds recommended by the makers of high speed steels, the R&R Deburring Tool performs most efficiently. High operating speeds mean more production, lower costs. Each tool is made in a full range of sizes to 1 1/2" diameter.

UNIVERSAL ENGINEERING COMPANY

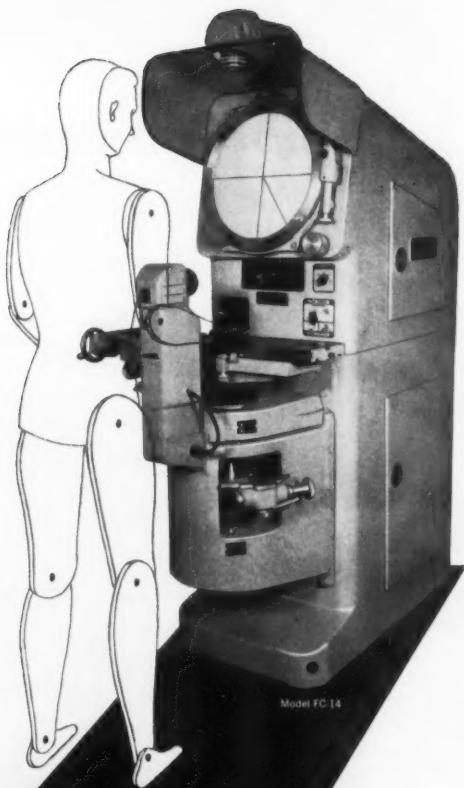
209

For more data circle 383 on Postpaid Card

86 modern machine shop

FRANKENMUTH 9,
MICHIGAN

March, 1959



Model FC 14

Meet NORMAN

the phantom employee of the "world's oldest and largest
builder of precision optical comparators"

Norman ("Norm" for short) isn't on our payroll, but nevertheless he's been doing good work here at J&L for a long time

"Norm" is the imaginary, "average" man around whom J&L designs its Optical Comparators.

Norm's physical measurements and characteristics determine such things as screen height and angles, the location of measuring controls, power elevation operating stations and the like.

That's why J&L Optical Comparators are so easy and convenient to use... so comfortable to sit down to or stand up to. By helping operators make the best possible use of their visual and muscular acuity, J&L Comparators cut down fatigue, speed up operation and improve accuracy of inspection and measurement.

Write for Catalog 5700, which describes the entire line of Jones & Lamson Optical Comparators.



JONES & LAMSON

MACHINE COMPANY

OPTICAL COMPARATOR DIVISION

Jones & Lamson Machine Company, Dept. 710, 521 Clinton Street, Springfield, Vt., U.S.A.

For more data circle 384 on Postpaid Card

March, 1959

modern machine shop 87

Accurate, High-Speed **GEAR GRINDING** at PH

58-tooth gear, 11 N.D.P.,
17° 49' helix, 2" face
width.
Grinding allowance:
0.014" over pins.
Material: 4140 steel,
245-285 Brinell hardness
Grinding time: 15 minutes.

14-tooth pinion, 11 N.D.P.,
17° 49' helix, 2 1/4" face
width for full depth
teeth.
Grinding allowance:
0.012" over pins.
Material: 4140 steel,
269-321 Brinell hardness
Grinding time: 8 minutes.

Tolerances:
Lead—0.0001" per inch.
P.D. runout—0.0005" T.I.R.
Involute profile—
plus 0.000, minus 0.0002".



Reishauer Gear Grinding Machine

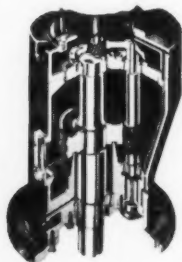
THE
PRECISION
LINE

Fellows

Gear

AR GRINDING

at PHILADELPHIA GEAR



When speed reducer gears need that extra degree of precision for smoother, quieter operation, the well-known Philadelphia Gear Works grinds them on a Reishauer because it is accurate and fast. For example, grinding time was only 15 minutes for the gear and 8 minutes for the pinion shown on the opposite page.

Gear grinding by the Reishauer method is a generating process. The involute gear teeth are generated by a grinding wheel on which a helix has been developed. The tooth section of the wheel is usually that of the basic involute rack.

Fellows builds the No. 12 Fellows-Reishauer Gear Grinding Machine under license from Switzerland's Reishauer Tool Works. The No. 12 grinds in both directions of travel of the work-slide and has a built-in device for crown grinding. Short set-up time permits the economical production of single pieces as well as long runs.

Capacities for the No. 12 are: Max. O.D., spur and helical, 12"; Max. face width, spur, 6¾"; Max. face width, helical, depends on pitch and helix angle; Pressure angles, 14½° to 30°; Pitch ranges (two lead screws are available), 6 to 48 D.P. or 20 to 120 D.P.

Grinding gears by the Reishauer method will give you precision gears at real production speeds. Ask your Fellows Representative about it.

THE FELLOWS GEAR SHAPER COMPANY

78 River Street, Springfield, Vermont

Branch Offices: 1048 North Woodward Avenue, Royal Oak, Mich.

150 West Pleasant Avenue, Maywood, N.J.

5835 West North Avenue, Chicago 39

6214 West Manchester Avenue, Los Angeles 45

Gear Production Equipment

For more data circle 385 on Postpaid Card

March, 1959

modern machine shop 89

free literature

**Use Postpaid Cards opposite page 32
and inside back cover for requesting
free copies of literature listed below.**

Milling and Boring Cutters

Ingersoll Milling Machine Co., 505 Fulton Ave., Rockford, Ill. Book tells how to improve milling and boring operations at reduced costs. Among subjects discussed are: importance of matching cutters to the exact capabilities of machines and to the work; a sure way to get maximum performance from replacement blades; set up and cutter sharpening equipment; description of typical milling and boring cutters, tool designs and factors affecting their selection. Request Booklet 68.

For more data circle 4 on Postpaid Card

Tool Grinder

DeVlieg Machine Co., Fair St., Royal Oak, Mich. This eight page color bulletin describes and illustrates the DeVlieg Micropoint Tool Grinder, which is simple to set up and easy to operate. It provides direct dial settings to precise tool geometry requirements.

For more data circle 5 on Postpaid Card

Indicator Positioner

Hubbard-Spring Machine Co., 117 East Third St., Uhrichsville, Ohio. Flyer presents information on an indicator positioner, which allows the dial indicator to be positioned in odd and unusual measuring positions. This instrument can be used in the inspection laboratory, toolroom, die shop, production or maintenance departments.

For more data circle 6 on Postpaid Card

Tool Steel

Universal-Cyclops Steel Corp., Bridgeville, Pa. This 12 page brochure concerns "Lo-Air" Tool Steel. The literature contains complete technical data on machining, heat treatment, mechanical and fatigue properties of this tool steel.

For more data circle 7 on Postpaid Card

Layout Fluid

Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn. Pamphlet describes marking fluid available in eight opaque colors.

For more data circle 8 on Postpaid Card

Power Presses

Sales Service Manufacturing Co., 2361 University Ave., St. Paul 14A, Minn. Bulletin No. 1158 illustrates and describes the 2 and 5 ton Press-Rite power presses in the Juniorline series. It includes bench and floor styles in standard, deep throat and air friction clutch models. Complete specifications are given.

For more data circle 9 on Postpaid Card

Drilling Service

20th Century Machine Co., 6070 East 18 Mile Rd., Utica, Mich. Four page color bulletin describes the unusual facilities of 20th Century for drilling difficult holes in production pieces of all types of materials and hardnesses.

For more data circle 10 on Postpaid Card

Power Cylinder Accessories

Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill. Catalog sheet lists the convenient cylinder accessories available for the clevis mounting air and hydraulic cylinders.

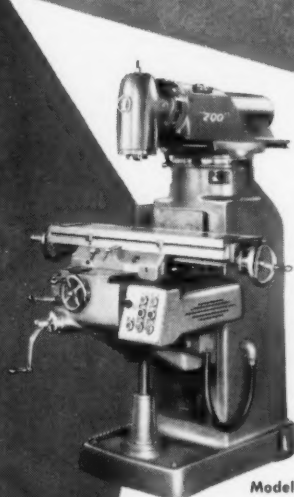
For more data circle 11 on Postpaid Card

Needle Thrust Bearings

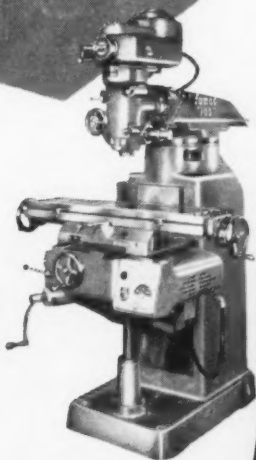
The Torrington Co., Torrington, Conn. Catalog No. 759 covers needle thrust bearings with increased capacity ratings. It lists the complete line in bore sizes from $\frac{3}{8}$ inch to 3 inches. Also, the catalog has an expanded list of thrust races for use with these bearings.

For more data circle 12 on Postpaid Card

modernize with Famco mills...



Model 200 (2 H.P.)



Model 100 (1½ H.P.)

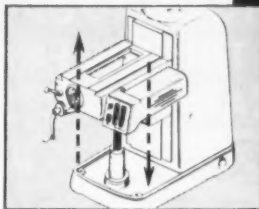
... THE MILL THAT GIVES YOU POWER FEED TO THE KNEE

The only line of milling machines in this capacity range that incorporates power feed in 3 directions—knee, table and saddle.

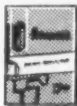
This Famco exclusive enables you to reduce operator fatigue and increase workmanship.

Besides, with power feed to the knee, you are assured of greater milling accuracy and versatility. This feature permits deeper more precise boring without any possibility of tool run-out.

If you want a rugged precision-built mill find out about the top quality Famco Mill line today.



Send for the Famco Milling Machine Catalog now.



famco

machine company

3122 Sheridan Road • Kenosha 3, Wisconsin

PRESSES... AIR, ARBOR, POWER, FOOT
SQUARING SHEARS, MILLING MACHINES, BAND SAWS

For more data circle 386 on Postpaid Card

free literature . . . (For free literature use postpaid card opposite inside back cover)

Lathes

South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind. Four page bulletin illustrates and describes South Bend 10 Inch Lathes, which are available in either bench mounting or floor types.

For more data circle 13 on Postpaid Card

Control Valves

The Beckett-Harcum Co., 985 West Locust St., Wilmington, Ohio. Comprehensive eight page bulletin illustrates and gives detailed descriptions and specifications on Beckett Hi-Cyclic air and hydraulic control valves. The line includes manual, electrical mechanical and pilot actuated types, $\frac{1}{8}$ to 1 inch N.P.T. sizes.

For more data circle 14 on Postpaid Card

Thread Rolling Attachment

Reed Rolled Thread Die Co., Holden, Mass. Information sheet shows the Model B5 Thread Rolling Attachment. Series B, two roll type. Complete application data for Unified and American External Screw Threads is given.

For more data circle 15 on Postpaid Card

Thread Rolling Attachments

Landis Machine Co., Waynesboro, Pa. Bulletin I-400-2 is a revised operator's instruction and repair parts manual on the Lanroll Thread Rolling Attachments. It includes dimension charts of each diameter and pitch, maximum bar and hex bar sizes, penetration rates for bolt, straight pipe and taper pipe applications for the five sizes of attachments.

For more data circle 16 on Postpaid Card

Valves

Hunt Valve Co., Salem, Ohio. Illustrated Bulletin No. 581 describes Slim Line Control Valves. The valves are only 1 inch thick by 3 inches wide, they mount conveniently on any machine and are easily manifolded into compact control centers.

For more data circle 17 on Postpaid Card

Carbide Cutting Tools

Wendt-Sonnis Co., Tenth and Collier Sts., Hannibal, Mo. Catalog No. 59 contains 72 pages devoted to a most complete line of carbide cutting tools, blanks and inserts. Included are 22 reamer styles, 10 drill styles, 29 end mill styles and 12 carbide grades.

For more data circle 18 on Postpaid Card

Shelving

Standard Pressed Steel Co., Box 556, Jenkintown, Pa. Form 2451 is an eight page bulletin that presents quick change, bracket type shelving and a broad line of steel shop equipment for industrial plant or laboratory.

For more data circle 19 on Postpaid Card

O.B.I. Presses

The Federal Machine and Welder Co., Warren, Ohio. Bulletin No. 52112 contains 12 pages, devoted to describing and illustrating the Warco line of o.b.i. presses in capacities from 40 to 200 tons. Included are charts, sketches and useful information to the press user.

For more data circle 20 on Postpaid Card

Granite Surface Plates

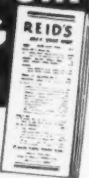
Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. Eight page catalog on precision granite surface plates, toolmakers' flats, straightedges, parallels and angle plates.

For more data circle 21 on Postpaid Card

Every TOOL ROOM NEEDS THIS BIG REID CATALOG

It's Free!

Send for this 78 page catalog, listing scores of needed tool room items.



C. I. HAND WHEELS

Made straight or dished in both solid web or spoked counter balanced types. Fine grain cast iron. Center



STRAIGHT

holes and faces of hubs are true to rim. Handles and rims are polished to high lustre. Many sizes. Low prices.



COUNTER BALANCED

REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 387 on Postpaid Card

Benders

Wallace Supplies Manufacturing Co., 1300 Diversey Parkway, Chicago 14, Ill. Booklet on Wallace Consensus Precision Tube Benders for aircraft, missiles and so on.

For more data circle 22 on Postpaid Card

Tubing Chart

Peter A. Frasse and Co., Inc., 17 Grand St., New York 13, N. Y. Tubing chart explains the method for calculating the tube size required to machine to a finished dimension. The chart gives typical examples to follow and clearly explains differences in o.d. and i.d. chucking. Furthermore, it illustrates, from a machining viewpoint, the dimensional variations in tubular sections.

For more data circle 23 on Postpaid Card

Coolant Blender

M. J. French Co., Inc., Post Office Box 23, Brighton Station, Rochester, N. Y. Flyer describes and illustrates a portable coolant blender and the French stationary blender.

For more data circle 24 on Postpaid Card

Marking Devices

New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7, Mich. Catalog MA-59 pictures automatic roll marker and manual marking devices for most product marking and identifying requirements. Several models for automatic o.d. and radial end face marking are shown, along with manual flat and round face markers, hammers, inspectors' stamps, holders and so on.

For more data circle 25 on Postpaid Card

Grinder and Accessories

Chicago Wheel and Manufacturing Co., 1101 West Monroe St., Chicago 7, Ill. This 12 page catalog concerns the Hi-Torque Handee and Hi-Power Grinders and accessories. It gives complete information on the Handee and its many uses, operation instructions and suggested applications. This completely illustrated catalog shows mounted wheels, saws, brushes, cutters, drum sanders and bands, for use with the Handee. Request Bulletin No. 6065.

For more data circle 26 on Postpaid Card



**DRILL-REAM
COUNTERSINK
COUNTERBORE**

**DOES ALL
FOUR!**

...on the same drill press
with
quadrigill

FOUR POSITION DRILLING & TAPPING TURRET HEAD

FITS ALMOST ANY
DRILL PRESS

No need to set up for each operation. A simple rotation of this turret head brings any of four drills or cutting tools into position. Speeds production—cuts cost! Specify size and make of drill press when ordering QUADRILL.

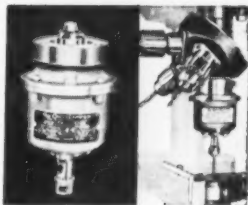
For Fast Accurate Tapping Operations use the **quadtapper**

You get precision tapping at high speed by simply attaching the QUADTAPPER to any of the four spindles of the QUADRILL. Write today for complete information on both these production tools.

CHICAGO QUADRILL

Company

1854 BUSSE HIGHWAY • DES PLAINES, ILL.



FOR USE ON QUADRILL ONLY

For more data circle 388 on Postpaid Card

Gear Finishing Machines

Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. Four page brochure 870-A-58 details two rotary external gear finishing machines. Close up photos illustrate the underpass, modified underpass and transverse gear shaving methods possible with the Michigan 870 and 870-A Machines. A short discussion on crown shaving is presented. Complete mechanical and physical specifications are contained in this two color brochure. Also included are illustrations of automated setups and other optional equipment.

For more data circle 27 on Postpaid Card

Projector

George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. Six page folder illustrates and describes the Scherr Micro Projector, which inspects and measures precision parts accurately, rapidly and economically.

For more data circle 28 on Postpaid Card

Magnetic Drill Stands

Thor Power Tool Co., 175 North State St., Aurora, Ill. Four page bulletin on the use and applications of magnetic drill stands. It describes precision drilling possibilities in difficult or remote areas, utilizing magnetic drill stands, the bases of which lock to any ferrous surface. Bulletin No. 10406 also explains how dismantling heavy machinery or building rigging for drilling work can be avoided.

For more data circle 29 on Postpaid Card

Semi-Automatic Lathe

Carl Hirschmann Co., Inc., 30 Park Ave., Manhasset, L. I., N. Y. Four page brochure on the Kummer high precision semi-automatic lathe (MR-6020) for applications in the fields of electro-mechanics, instrument manufacture, ordnance, optics and fine mechanics in general.

For more data circle 30 on Postpaid Card

Workholding Devices

De Witt Equipment Corp., 190 Elizabeth Ave., Newark 8, N. J. This 24 page color catalog gives complete information and illustrations of a complete line of workholding devices. A price list is included.

For more data circle 31 on Postpaid Card

Drilling, Tapping and Boring Machines

Burg Tool Manufacturing Co., Inc., 15001 South Figueroa St., Gardena, Calif. Bulletin briefly illustrates the line of turret type drilling, tapping and boring machines. The bulletin shows the line of standard Burgmaster turret drills, including the hand operated turret drills, radial type, automatic hydraulic, numerically tape controlled, special type turret drills and the line of Tool Flex floating toolholders.

For more data circle 32 on Postpaid Card

Ceramic Tooling

Duramic Products, Inc., 262-72 Mott St., New York 12, N. Y. Bulletin 115 lists six basic Duramic Hi-temperature tooling materials, their properties, availability and principal applications. This acts as a handy guide to tool and process engineers in selecting the right material for their hi-temp work.

For more data circle 33 on Postpaid Card

Rivets

Hi-Shear Rivet Tool Co., 2600 West 247th St., Torrance, Calif. This 33 page color catalog is of interest to fastener and tooling personnel in the aircraft, missile and related industries. Included in the catalog are many new rivet sets to drive stainless steel and harder material collars.

For more data circle 34 on Postpaid Card

O.B.I. Presses

Perkins Machine Co., Warren, Mass. Flyer presents the Perkins 1½ ton Junior Press, which features bronze bushed main Pitman and wheel bearings, cap front ram, adjustable brake, single trip clutch and accuracy in construction. Complete specifications and optional equipment are included.

For more data circle 35 on Postpaid Card

Precision Tools

Brown and Sharpe Manufacturing Co., Industrial Products Division, Providence 1, R. I. Illustrated Bulletin M81 shows latest developments in precision tools. Items include a convertible thimble micrometer, height gages, a transistorized unit, tool setting gages, edge fingers, radius gages, sine plates, dial snap and bore gages, permanent magnet chucks and precision ground tool steel. Specifications and prices are included.

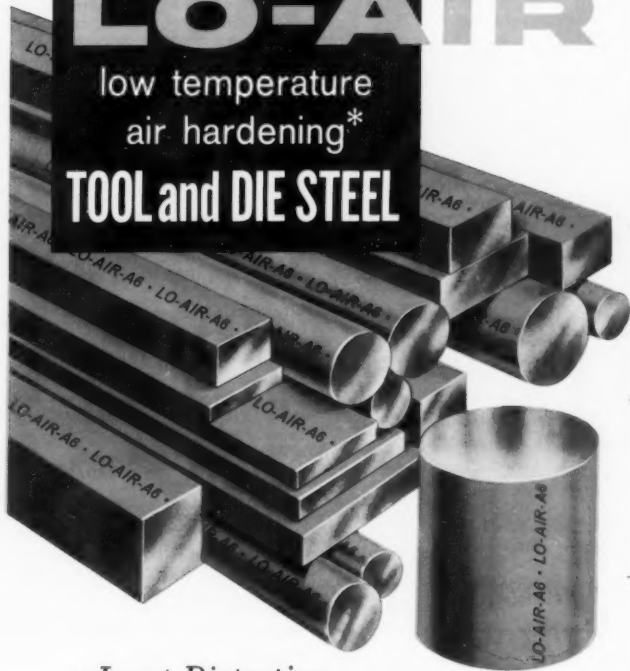
For more data circle 36 on Postpaid Card

Announcing...

LO-AIR®

low temperature
air hardening*

TOOL and DIE STEEL



Least Distortion

Easy to Machine

New from Universal-Cyclops, LO-AIR is an air hardening tool steel remarkably free from distortion in hardening. Even more remarkable is its ease of machining. Now you can combine the simplicity of hardening and ease of machining typical of oil hardening tool steel (AISI O1) with the safety of an air hardening grade. Write for our descriptive brochure No. TS-101, or better yet order a bar from your nearest Universal-Cyclops sales office or warehouse. Complete stocks are available.

*U. S. PAT. NO. 2,355,244

**UNIVERSAL
CYCLOPS**
STEEL CORPORATION
BRIDGEVILLE, PA.

TOOL STEELS • STAINLESS STEELS • HIGH TEMPERATURE METALS

BLANKING

STAMPING

TRIMMING

COINING

EMBOSSING

PUNCHING

PIERCING

For more data circle 389 on Postpaid Card

March, 1959

modern machine shop 95

Mechanical Seals

Syntroon Co., 309 Lexington Ave., Homer City, Pa. Catalog section on mechanical seals, which stop the leakage of gas and liquids from around the rotating shafts of pumps, compressors, mixers and so on. The first three pages contain typical installations, complete descriptions, data and specifications for mechanical shaft seals in a range of sizes for shafts with diameters of from 1/4 inch to 3-15/16 inches. The fourth page presents details on the complete line of custom built roll neck seals.

For more data circle 37 on Postpaid Card

Storage Racks

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. A pictorial folder describes standard size adjustable storage racks. Three shelves of these P-S 60 Series Racks have been tested up to 5,000 pounds capacity each.

For more data circle 38 on Postpaid Card

Alloys

Haynes Stellite Co., Kokomo, Ind. A valuable guide to the corrosion resistance of Haynes Alloys is now available. Packed into this 40 page booklet are many charts and graphs that show penetration rates for the alloys in over 250 corrosives.

For more data circle 39 on Postpaid Card

Coated Abrasives

The Carborundum Co., Niagara Falls, N. Y. Practical information kit makes it easier to specify and order coated abrasives. In the kit is a Buyer's Guide, Form A 1506, with convenient reference tables and forms for listing requirements, a selector chart for metalworking operations, Form A 1507, selector chart for woodworking operations, Form A 1508, a compact brochure, Basics in Coated Abrasives for the Metalworking Trades, Form A 1509, and a brochure, Basics in Coated Abrasives for the Woodworking Trades, Form 1510.

For more data circle 40 on Postpaid Card

Boring Units

Valenite Metals, Box 205, Royal Oak, Mich. A 16 page catalog covers a new series of micro-adjustment boring units for use with throwaway inserts. The catalog is printed in two colors and lists a large number of standard boring unit styles, as well as standard boring bars, utilizing MicroDex Boring Units.

For more data circle 41 on Postpaid Card

Power Scraper

Borel and Dunner, 19313 Farmington Rd., Livonia, Mich. Color pamphlet J-2 announces the Biax Power Scraper. Details on the development of this scraper from a simple expedient to a portable tool of high power and efficiency are given, along with advantages of the tool, specifications and operation.

For more data circle 42 on Postpaid Card

Tube Furnaces

Hevi-Duty Electric Co., Milwaukee 1, Wis. Flyer describes and illustrates carbon resistor tube furnaces with temperatures up to 5,000 degrees Fahrenheit. Request Bulletin 858.

For more data circle 43 on Postpaid Card

Locknut

National Machine Products Co., Utica, Mich. Four page brochure describes one piece reusable prevailing torque locknuts. It includes complete engineering data and specifications.

For more data circle 44 on Postpaid Card

O.B.I. Presses

Minster Machine Co., Minster, Ohio. Four page bulletin illustrates and describes Series 1 Limited Specification Type O.B.I. Presses in capacities from 35 to 75 tons.

For more data circle 45 on Postpaid Card

Cutting Tools

Quality Tool Works, 792 South Market, Waukegan, Ill. Color catalog and price list illustrate a complete line of standard and special high speed steel cutting tools for toolroom and production use, including several styles of Woodruff keyseat cutters, milling cutters and slitting saws. All tools are clearly illustrated and described.

For more data circle 46 on Postpaid Card

Milling Machines

Farrel-Birmingham Co., Inc., Consolidated Machine Tool Division, 565 Blossom Rd., Rochester 10, N. Y. This 32 page bulletin describes the line of special Newton Milling Machines. Profusely illustrated, it features a complete line of special production line millers, including straight line, vertical open side, sliding head, shuttle type, rise and fall, rotary index, traverse, planer and traveling column. Request Bulletin 675-A.

For more data circle 47 on Postpaid Card

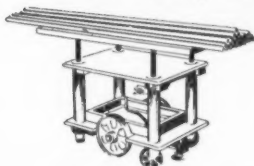
NOW!

NEW *Convenience*
NEW *Capacities*
NEW *Designs*



PORTELEVATOR

The Handy HAMILTON Portable, Elevating Table



NEW

provision for increasing table area!

NEW

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March, 1959

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All Purpose Steel Bars

LaSalle Steel Co., Post Office Box 6800-A, Chicago 80, Ill. Helpful 24 page booklet entitled "How to Make Your Own Machine and Repair Parts Quicker and Easier." It has been designed especially to help solve maintenance and repair part problems.

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Tools and Accessories

Rockwell Manufacturing Co., Delta Power Tool Division, 606B North Lexington Ave., Pittsburgh 8, Pa. Catalog presents all of the facts on the complete line of Delta metalworking and wood-working tools and accessories.

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Packaging Products

Jiffy Manufacturing Co., 377 Florence Ave., Hillside, N. J. Descriptive literature is available on all Jiffy packaging products, including reinforced padded shipping bags and utility bags, which are not padded.

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Universal Chucks

Garrison Machine Works, Inc., Dayton 4, Ohio. Four page folder illustrates the Garrison Controlled Pressure Universal Chuck, which opens wide to permit easy loading and unloading of workpieces.

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Utility Ovens

Blue M Electric Co., 138th and Chatham St., Blue Island, Ill. Two flyers describe and illustrate the Blue M Test-All Mechanical Convection Utility Ovens. Complete specifications are given. One flyer covers the bench models, the other covers the floor type.

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Recorders and Controllers

Surface Combustion Corp., Toledo 1, Ohio. "Autocarb" is the title of a six page two color gate folder on Surface Automatic Dew Point Recorders and Controllers. Autocarb systems for control of carbon potential and their applications are described. Installation photos, illustrations of the new standardized line of control instruments and a chart for selecting the proper system are included. Request Bulletin SC-181.

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Stationary Air Housing

The Conway Clutch Co., Cincinnati 25, Ohio. This eight page color bulletin shows the Stationaire stationary air housing. Descriptions and illustrations of this complete line of industrial clutches are given.

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Rotary Cutting Tools

Rico Tool Co., 5915 Dixie Highway, Saginaw, Mich. Catalog presents carbide and high speed steel rotary cutting tools. Included are solid carbide end mills, diesinking cutters, keyseat cutters, grinding burrs, chucking reamers, carbide twist drills, slitting saws, countersinks, rotary cutters, spade drills, boring tools and miniature lab mills. Rico can grind to specifications or re-grind dull and worn cutters of any make.

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Spot Welders

Sciaky Brothers, Inc., 4915 West 67th St., Chicago 38, Ill. Six page color folders shows the SRO air operated rocker arm spot welders, which feature single phase resistance welding.

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Socket Screw Products

Safety Socket Screw Co., 6519 North Avondale Ave., Chicago 31, Ill. This 23 page color catalog presents the company's socket screw products, together with net prices.

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Wheel Dresser

Nu-Dress Tool Co., 2235 East Artesia Ave., Long Beach, Calif. Flyer on the Nu-Dress Micro-Feed Wheel Dresser for precision grinding. It dresses wheels in five seconds and is said to double the life of the wheel.

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Steel Tubing

Armco Steel Corp., 1279 Curtis St., Middletown, Ohio. P. O. 5558 is a six page folder that tells how designers use special coated steel tubing for various products and parts. Properties of Zinc-grip and Aluminized Steel Type 1 and 2 are described and o.d.'s and gages are recommended for typical products. An o.d.-gage-shape range and gage-decimal thickness conversion table is included.

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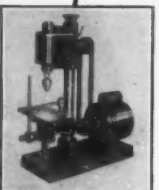
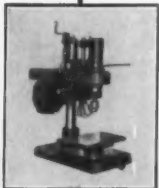
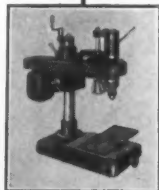


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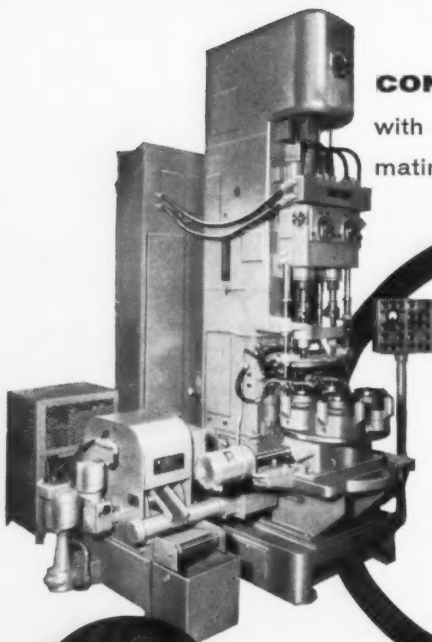
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March, 1959

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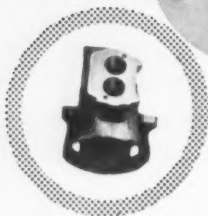
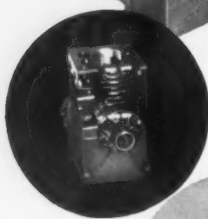


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OVER THE EDITOR'S DESK . . .



EVIDENCE FOR ACTION

We feel that it would be difficult to find anyone in this country who does not believe that our industries are in a position to match the production output of industries anywhere in the world. Especially would any person questioned believe this to be true because of the tremendous expansion of almost every industry that has taken place in recent years and particularly just prior to the leveling-off and recession period of last year.

The point that we are compelled to make here, however, is that what we yesterday could point to with pride as tremendous productive capacity has been caught up with and is being rapidly surpassed by our political opposites from the opposite side of the world today and poses a threat the like of which we have never before been called upon to face.

Our particular concern, as far as metalworking productive capacity is concerned, is that we are being forced, because of a totally unrealistic depreciation allowance setup in our country, to more and more make use of over-age and obsolete equipment. Must we wait until a catastrophe is upon us before legislators will realize how

vitaly important is the machine tool industry to ordinary consumer as well as defense production?

How long will it take our legislators to realize that they are responsible for forcing many important builders of tools and equipment to establish plants abroad where, in the event of a serious emergency, they could be quickly overrun, and result in a total loss to us?

How long will it take our lawmakers to realize that our production facilities are not being equipped with the latest and best equipment fast enough because of a tax setup which does not adequately permit such modernization?

The Russian plan calls for the production of machine tools at the rate of 200,000 per year by 1965. U. S. production based on current production figures could conceivably go up to one-fourth that amount. The tragedy lies in the fact that we could make use of thousands more to overcome just the factor of obsolescence alone. If we wish to remain an important power in the world, someone beside the builder of tools will have to recognize the fact that we will never replace obsolete machine tools with obsolete tax legislation.

How do Russian tools compare

machine any job

anywhere

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VERSA-MIL[®]
PORTABLE PRECISION MACHINING

**Basic Unit and 7 Attachments Lets
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Designed throughout to machine tool specifications, it provides a rugged machining unit which can be taken to the work instead of bringing the work to the machine. And, when you *take the machine to the work*, you...

- machine where it is most economical
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only
\$565 *
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March, 1959

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with ours? You yourself may be the judge if you read the report about Russian metalworking written by Richard E. Stockwell beginning on Page 108 of this issue.

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TELL YOUR CONGRESSMAN

Your Congressman and Senators will be asked by union leaders to increase the minimum wage to \$1.25 an hour as one of the first orders of business. You might suggest to your legislators that government wage fixing would be a little more logical if at the same time the government fixed some minimum production standards for employees, which of course it could never do.

A higher minimum in any firm tends to push up wages all along the line, as each wage group in turn insists on maintaining its differential. Then these raises tend to spread out and force up the prevailing wage rates of the community in an uneconomic manner and get translated into high living costs.

So ask your Congressman why it is that while the government concerns itself with seeing that employees at the very bottom of the scale—usually those least capable of productive work—are not underpaid, the government pays no attention to the vast force of featherbedders who loaf and live off the productivity of those who work. Many featherbedders are highly skilled, yet through the power of

their unions, they are able to command full high pay for doing far less than their productive capacities, or for going through entirely unnecessary and unproductive motions, or, in many cases, for doing nothing at all.

Unnecessary extra crewmen, most of whom merely loaf, cost the hard-pressed railroads \$500 million a year.

Stand-by orchestras draw full pay for not playing a note.

Bogus typesetters sit at their machines in newspaper composing rooms day after day setting type that is carefully proof-read and corrected and then dumped into the hellbox. Much news typesetting has been made obsolete by automatic processes. Yet unions require that everything reproduced by the new methods must be done over again by typesetters, for no purpose at all.

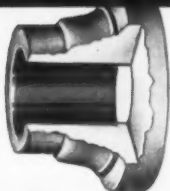
And look at the construction industry!

Bricklayers who used to lay 1,000 bricks a day handily, now limited by union rules to 500 . . . paint brushes limited to four inches; use of spray guns restricted . . . electricians limited on number of outlets per house per day . . . ready-made window frames and cabinets outlawed; they must be made on the job . . . carpenters refuse to hang and fit more than a certain number of doors per day . . .

How much less it would cost to build an addition to your plant; how much less your office rent might be without waste like that!

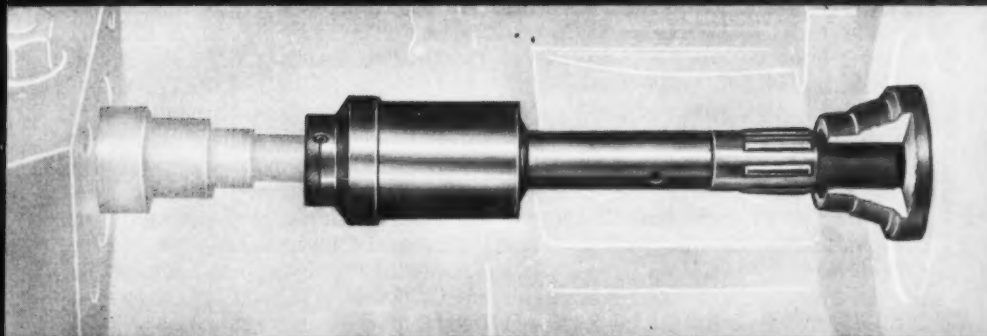
Or like this . . . union rules requiring that pipe be threaded on the job; that plumbers ride in trucks delivering materials to job . . . refusal to handle Ready Mix

from 125 to 5 micro-inches



surface
finish

in one 5-second pass!



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- Finishes roughest bored or turned surfaces (ie: 200 mu-in. and higher) to finishes of 4 micro inches and lower.
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- Finishes all machineable metals . . . all types of surfaces; internal and external cylindrical . . . tapered, radial, flat.
- Use tool in any machine . . . on any drill press, engine or turret lathe as a secondary operation . . . or right on the screw machine or automatic where other operations are performed! No special equipment needed.

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- Sizes in increments of .000025" or less . . . performs sizing operations never before possible. Invaluable for sizing bearing seats, oilite bushings, parts out of tolerance, etc.
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- Stock shipment in popular sizes. Tools and replacement parts available from stock for off-the-shelf delivery.
- Refined, improved surface, a new concept. Tool marks and surface imperfections are rolled out. Grain structure is condensed and compacted . . . workhardened and refined; fatigue properties are improved. An ideal, wear-resistant, surface results . . . free of damaging abrasive grit inherent in honing or grinding.
- The top twenty companies in the metal working field . . . plus more than a thousand others have replaced costly finishing and sizing methods with the Microller burnishing tool. In actual case histories, finishing costs have been cut by 90% . . . production rates increased by eight and nine times.
- Results guaranteed: The Microller is backed by Madison-Faessler's 80 years of experience in producing cold rolling tools . . . and is sold on a results guaranteed basis. Sales and service representatives in all principal cities.

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concrete . . . refusal to permit a bricklayer to back-plaster his wall . . . refusal to allow laborers to unload trucks . . .

Featherbedding robs the public by adding to the cost of vital goods and services. It destroys jobs—as idle musicians can testify, their services having been priced out of the market to the extent that a new profession—the disc jockey—has been born.

In every industry where competition with other industries makes it impossible to add the costs of featherbedding to prices, the featherbedder is taking money that otherwise would be available to raise the pay of productive workers. He is dragging down the wage scale that the advocates of government wage fixing are so bent on forcing up.

Featherbedding should be stopped by federal and State laws.

In the absence of federal laws on featherbedding, federal wage fixing becomes absurd. Tell your Congressman so.

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INCOME

T. Coleman Andrews, former Commissioner of Internal Revenue, recently published an article in which this information is given. In this article most taxpayers may for the first time see for themselves just how the income tax and inflation

have affected them and what the future effect will be if the present trend continues. Here are a few examples:

In 1957, it took an income of \$4,806 to match in purchasing power (after taxes and inflation) a 1939 income of \$2,000; \$13,004 to match a 1939 income of \$5,000; \$30,971 to match a 1939 income of \$10,000.

This is what has happened during the past 18 years in which as the result of a speeding up in the velocity of monetary circulation and of inflation caused primarily by unbalanced budgets, the purchasing power of the dollar has been cut in half. Looking ahead 18 years to 1975, if the same rate of shrinkage in the value of our money continues (and present indications are it may be even greater) the dollar will be worth less than 25 cents.

In this event, in 1975, Mr. Andrews points out, it will take an income of \$10,538 to match a 1939 income of \$2,000; \$33,240 to match a 1939 income of \$5,000; \$92,141 to match a 1939 income of \$10,000.

Unless this trend can be fully checked, the outcome is certain to be disastrous.

To check this trend, these things are urgently needed:

1. There must be a drastic reduction in Federal spending, all waste and extravagance must be eliminated, and the Federal budget must be balanced.

2. The degree of progression in the individual income tax must be drastically reduced.

The importance of these two steps as safeguards against ultimate national and individual financial ruin cannot be over-emphasized.

ARMSTRONG

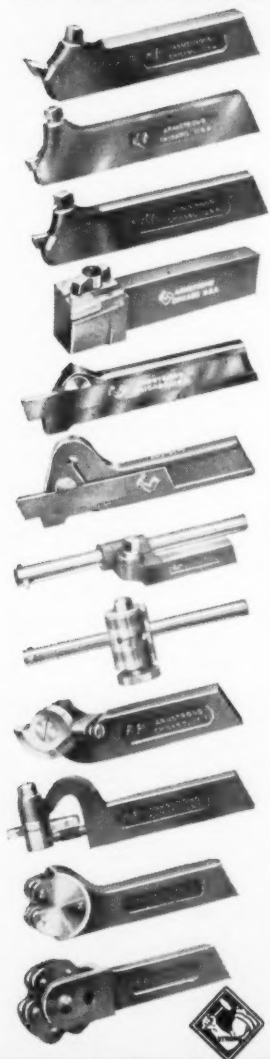
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March, 1959

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Metalworking and Machine Tools in the USSR

The author of the book "Soviet Air Power" describes his visit to several manufacturing plants and to the Moscow Agricultural and Industrial Exhibition.

By RICHARD E. STOCKWELL

The latest Soviet seven-year program calls for an over-all 80 percent increase in production over the next seven years. This means that by 1965 the USSR proposes to turn out 100 million tons of steel,

and that, in turn, means that a considerable expansion in the metalworking industry must take place in the USSR.

As yet the Russians haven't seen fit to release their estimates on

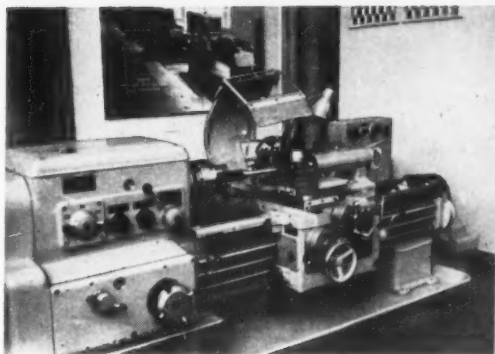
The main hall of the Machinery Pavilion, Agricultural and Industrial Exhibition, Moscow, features tractors, harvesters, and buses.

Some 50,000 people visit the Exhibition each week day during the summer months, and three times as many on Sunday.



metalworking capacity for 1965, but they have said as recently as 1957 that they will be turning out 200,000 machine tools per year in 1960. And at the same time they say they will improve the quality and productivity of their machine tools.

In assessing what the Russians say they are doing in the development of machine tools, one must first realize that they have lagged far behind the West in both production and technology. As recently as the 1940s, the lathes, grinders and drills manufactured in the West generally turned six times as fast as those produced in Russia. And when World War II came along, Russian machine tools and production plants were, for the most part, scooped up by the German advance through the more industrialized West of Russia. Not until after World War II were the Russians able to rebuild their industry. But



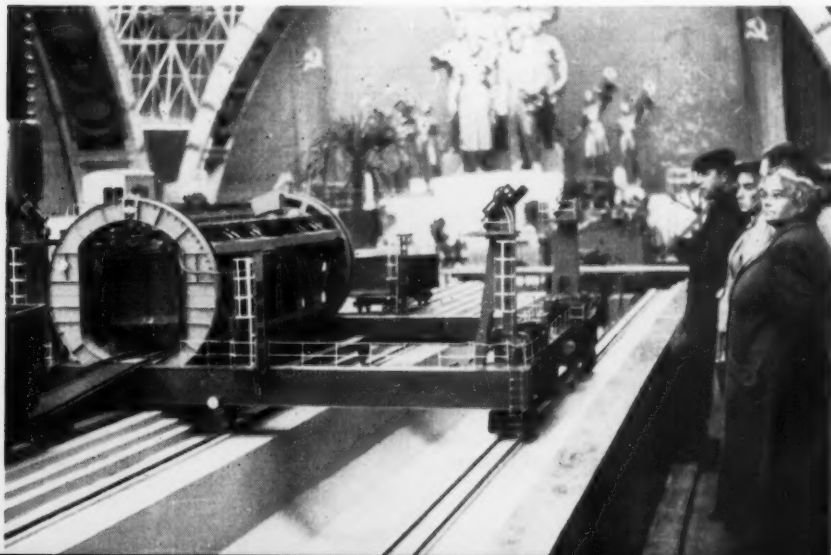
A plain engine lathe on display in the Machine Tool Pavilion at the Exhibition. This model was new this year and is equipped with a hydraulic copying attachment.

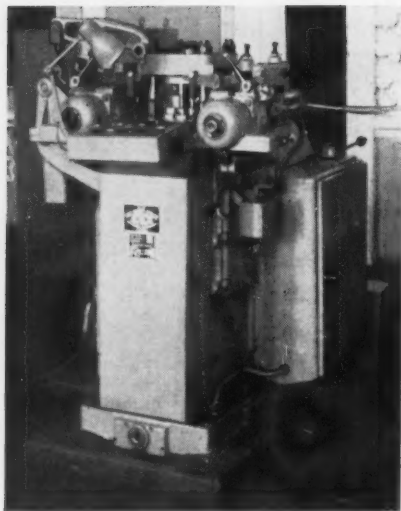
then they borrowed and copied the designs of the West, and built tools at a tremendous rate.

As a result, what the western visitor may see in the way of machine tools when he enters a Russian plant today may confuse him by its sheer contrast. During

Coming events cast their "models" before them, although this coal car dumping device may not be seen in Russia yet, it is evident

that the Soviets are moving rapidly in the direction of such devices—all of which continue to amaze and interest average Russian.





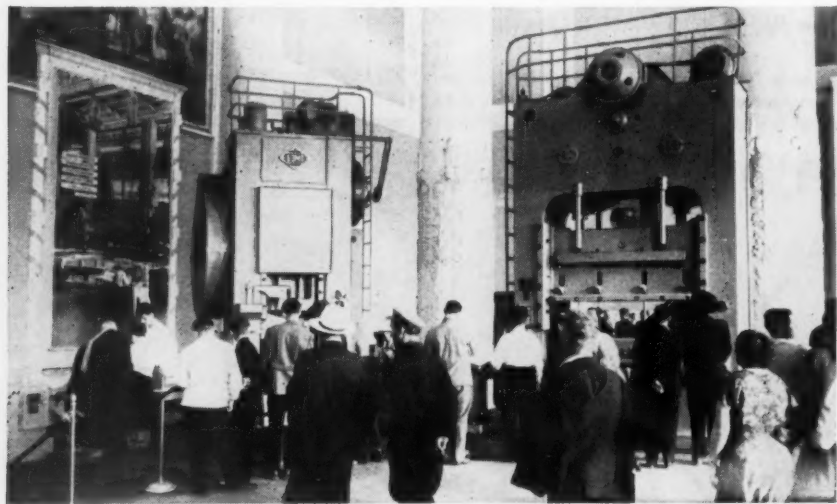
This Russian-built high speed die press, comparable to the U. S.-made Henry and Wright press, was used to stamp out souvenir silhouettes of the Tu-104 jet transport for the children who passed through the exhibit.

**"Russian factory managers
don't like foreign visitors . . ."**

my most recent trip to Russia, I was able to visit a small, hand tool plant in Stalingrad.

An invitation to visit a Soviet factory is rather hard to come by. Russian factory managers don't like foreign visitors for two reasons, insofar as I am able to judge. There is the slippery question of security—how much should and shouldn't be shown—and foreign visitors are becoming a commonplace bother.

The factory in Stalingrad made small hand tools, bolts, rivets and springs for a nearby tractor plant, one of the largest in Russia, and an important tank factory during World War II. It was called the "Factory of Metal Details," as near

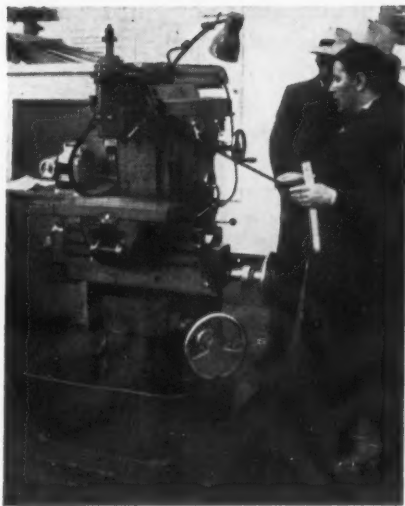


Two presses on display in Machine Tool Pavilion. On the left is a high speed forging press of rather small size. On the right is a double crank knuckle eccentric press.

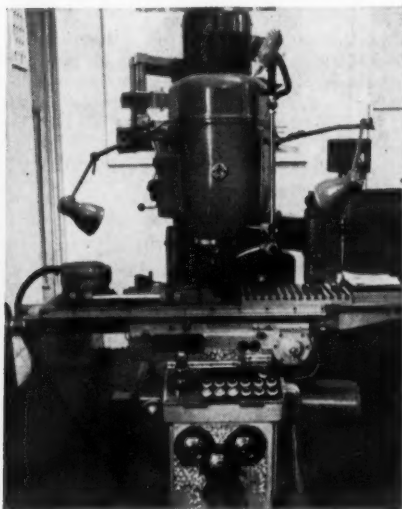
"Equipment in the plant looked old and well used."

as the name could be translated, and Dmitri Keilev, the chief engineer, took me through. In this factory, I was not allowed to take any pictures. (The illustrations which accompany the text of this article and continued article, April issue, are photographs taken by author at the Moscow Agricultural and Industrial Exhibition.)

The factory consisted of several rather small, one-story buildings sprawled over nearly two-dozen acres. In production were some 950 different kinds of nuts and bolts, a dozen varieties of springs, several hand wrenches, pliers, a crescent-type wrench, grease guns and items of that type. Equipment in the



Vertical precision milling machine shown was explained to satellite-nation visitors. It was for export, though the Russians would quote no prices at the Exhibition.

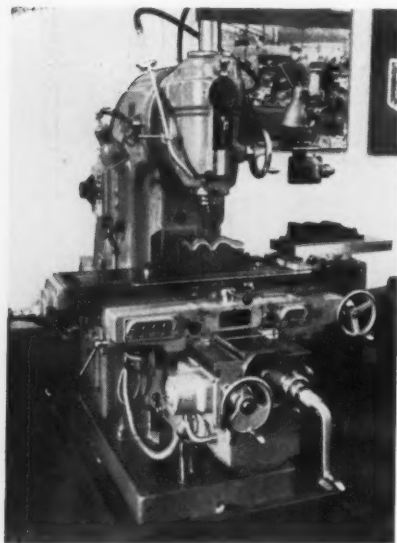


Progressive type vertical mill with duplicating attachment. Note push-button control.

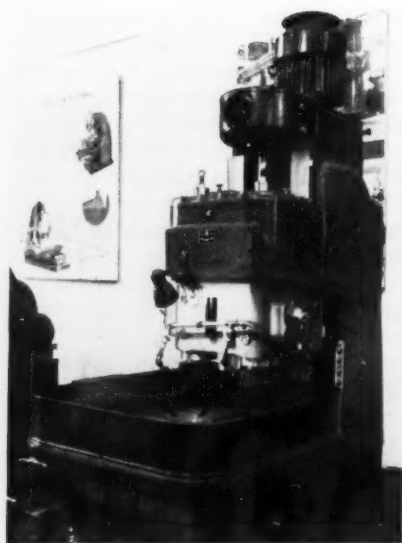
plant looked old and well used, for the most part. There were small presses for producing the hand wrenches, pliers and grease cylinders. There was also a rather extensive plating department, that put more chrome on wrenches going to tropical areas than upon those going to arid regions; coiling devices for producing the various kinds of springs; bolt headers and threaders; and some modern induction heat-treating machines that treated the pins in caterpillar tractor treads at a rate of one every three seconds.

I watched two men coiling large springs that would support the tractor bodies. Each was earning some 1200 rubles (For comparison, present official rate of exchange is 4 rubles to one U.S. dollar) per

"I timed the coiling operation from start to finish and it took 18 seconds . . ."



Plain vertical milling machine equipped with swivel head and copying attachment. This has been identified as a Soviet copy of a Vandar milling machine made in Germany.



Two-spindle continuous or rotary milling machine. It was quite similar to machines produced by Newton and Ingersoll and by Davis and Thompson in the United States.

month for coiling some 600 springs per day (eight hour shift). The two men worked together, one pulling the white-hot bar-stock out of a gas-heated oven and clamping one end of it to a coiling device. He hammered the end into a crude hook and locked it into position with a pin that ran through the coiling spindle, which was turned by an electric motor. When the bar had been coiled, the spindle was stopped, and the pin driven free. The second man then pulled the coiled spring off the end of the coiling spindle and immediately

dropped the coiled spring into an oil tempering bath.

The bath operated on a continuous chain-belt, and the spring emerged a few minutes later out the far side, ready to have the two ends ground smooth. This was a hand operation. The springs were about three inches in diameter and three-eighths or half-inch stock was used. I timed the coiling operation from start to finish and it took 18 seconds; it would have been no problem at all for the two men to do 120 per hour.

In the bolt shop, all the heading

"Lighting was bad and there was little evidence that the inside of the structure had been painted."

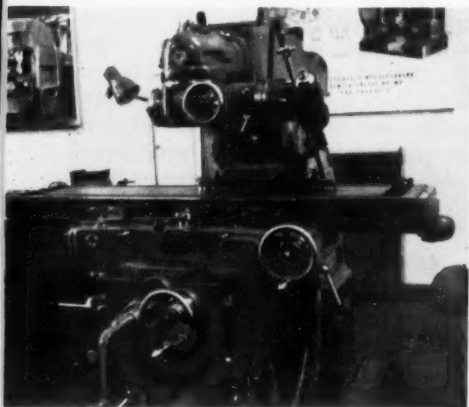
was cold-process, which produced a deadly din with some 20 machines working at a time.

The factory buildings were badly crowded, with people working practically back to back and elbow to elbow. Lighting was bad but typical of Russia, and there was little evidence that the inside of the structure had been painted. Floors were greasy and somewhat slippery. Aisles were barely large enough in some buildings to accommodate the electric lift trucks.

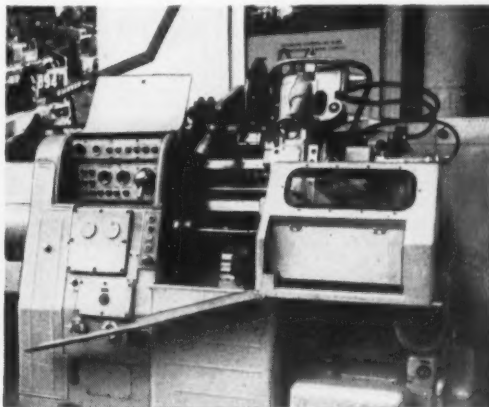
The bolt shop and spring coiling operation were destined for greater automation, Engineer Keilev told me. He said he had plans that would replace the two men working at the coiling spindle previously

described and the one man on the grinding operation. Similarly, he said that he had plans for further mechanization in the bolt shop. Keilev expected to increase production by 20 percent in a matter of months without putting up any more brick and mortar, merely by increasing the degree of mechanization in his plant. The necessary equipment would be purchased with an interest-free state loan, it was explained to me.

He indicated the increased output would be needed to compensate for an anticipated increase in demand for tractors now that the collective farms are to own their own equipment. Machine tractor stations are being abolished in Rus-



Full universal milling machine with tilting cutter head that will tilt in any direction. Here it is possible to see how Russians often combine modern electronic controls with hand operated controls on same machine.

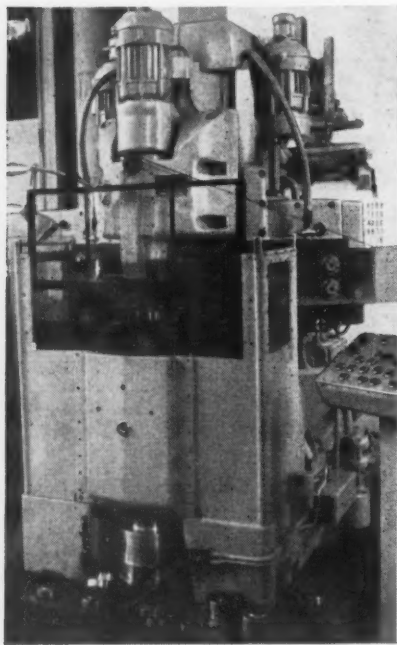


Here again automatic and hand-operated controls are combined in same machine. This is a hydraulic single spindle tracer lathe with programming equipment. It is a copy of George Fischer lathe made in U. S.

"To get to be a highly skilled worker one had to work as an apprentice for two or more years."

sia. This will mean more tractors, though smaller in size.

I was told that the workers in the entire factory averaged 1100 rubles per month, which is well above the Soviet industrial average of 800-900 rubles per month. Many earn much higher wages by exceeding the norms for their jobs, and it was quite easy, apparently, to achieve 115 percent of norm and get a pay of 1400 to 1500 rubles.



Rotomatic shaper (gear shaper) on display. Some of the output from this machine can be seen at the bottom of the illustration. Again, this machine could be programmed.

About one-half of the workers in the plant were women, and their husbands and perhaps other members of the family worked in the same plant. To get to be a highly skilled worker one had to work as an apprentice on a job for two or more years. For those who wished them, classes for more advanced study were available in the plant.

Surrounding the plant area were dozens of eight and ten story apartment buildings. Here is where half of the workers lived. The other half owned their own homes and no doubt they had garden plots that entirely surrounded them. (Never did I see a lawn mower in Russia.)

Most of the apartments had two rooms, plus kitchen and bath, with simple furnishings. Rent is based on the living and sleeping rooms, and the charge is so much per square meter of living area. The Stalingrad rate was one ruble, 30 kopeks, or about 13 cents per square meter per month. Apartment rent included heat, water, cooking gas and electricity — but not a telephone, which, when available, costs seven rubles per month.

Rent in Russia is low, though there aren't near enough apartments. A tremendous effort is underway to build apartments as fast as possible. Chief Engineer Keilev told me that five percent of his workers still were looking for apartments, but that soon a new building with 56 apartments would be opened. While his plant lost money on the apartments, the chief engineer

"A rigorous inspection system was in effect because pride of workmanship is not common among workers in Russia."

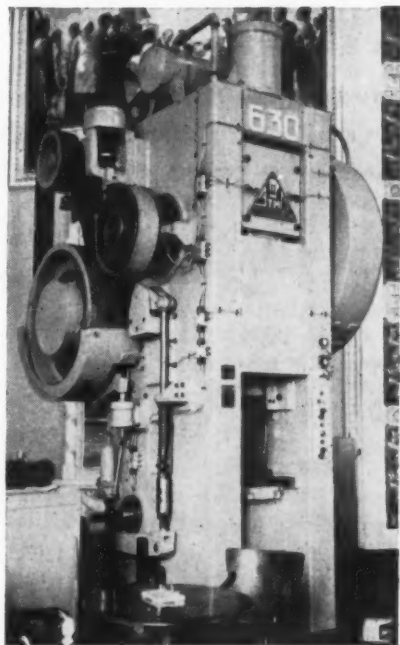
explained that the state made up the difference to the factory.

Most of the workers in the plant were on a piece work basis. A rigorous inspection system was in effect to maintain quality, apparently because pride of workmanship is not common among the workers in Russia.

There was a small tool design shop attached to the plant. Here there were about 80 simple machine tools; each had its own operator. Repair parts, new designs and tool dies and bolt threading dies were made here. I was shown a block of tungsten-carbide steel, grooved to cut the threads onto the end of a bolt, and I was told some work was being done with molybdenum in the shop. Most of the work was with steel-base alloys, however.

I was surprised to see many English, American and German machine tools in the shop as well as those of Russian design. Elsewhere in the plant, nearly all machines carried Russian labels, though some clearly were copies (in varying degree) of western designs. Real pride of technical origination is something quite foreign to either the Communist or the Russian, as near as I could tell.

In 1957 I visited Tiflis in the Georgian Republic. There I was shown an automatic tea packaging plant. The key feature I found in this plant was a machine that unrolled paper stock and folded it into a small, square packet, about two inches on all three sides. Then



A Russian-designed high speed punch press.

a measured 50 grams of pre-blended tea leaves were dumped into the packet, which then was folded shut and sealed by this single machine. The director of the Tiflis Tea Plant said the machine had been designed in Russia, but was built in Germany. The tag on it said "Nogema" from Dresden, East Germany. There were 13 machines in the plant, which had nearly doubled its output by shifting to automation from hand operations, and at the same time had halved employment.

(To be concluded in next month's issue)

a look at ULTRASONIC MACHINING

Advantages of this unique process as well as the operation and application of ultrasonic machining equipment are discussed.

By **GILBERT C. CLOSE**
Field Editor, Modern Machine Shop

What is ultrasonic machining? How do ultrasonic machines operate? What sort of work do they do? How much do they cost, and will it pay the average job shop to install such equipment? To obtain the answers to these questions, this writer decided to visit a job shop where ultrasonic machining equipment was being used and obtain the information first hand.

The decision to visit such a job shop was much easier to come by than to find a job shop where ultrasonic machines were being used. While a number of large manufacturing companies, especially the air plants, are using ultrasonic machines for specialty work, investigation revealed that less than a half-dozen job shops in the entire metropolitan Los Angeles area were similarly equipped. Finally, the L. C. Miller Company of Los Angeles was settled upon as the object of our attention. The L. C. Miller Company not only employs ultrasonic machining equipment in contract work, but has wide experience

in all types of specialty work. In addition to ultrasonic machining equipment, this shop employs metal disintegrators, advance design induction heating equipment, and numerous high precision machines of the more conventional types.

The work accomplished consists largely of special dies, machined optical components, and critical detail components for hydraulic and electronic systems, along with research service on such parts. L. C. Miller Company engineers serve also as design consultants, making certain that such critical specialty work can be produced with available machine shop equipment. It is the type of job shop where you would expect to find ultrasonic machines being used to their best advantage.

This shop employs a single Sheffield Cavitron ultrasonic machine of 1000 watts capacity. Mr. L. C. Miller himself answered one of our questions with a few well-chosen words . . . "Ultrasonic machining should be used only when

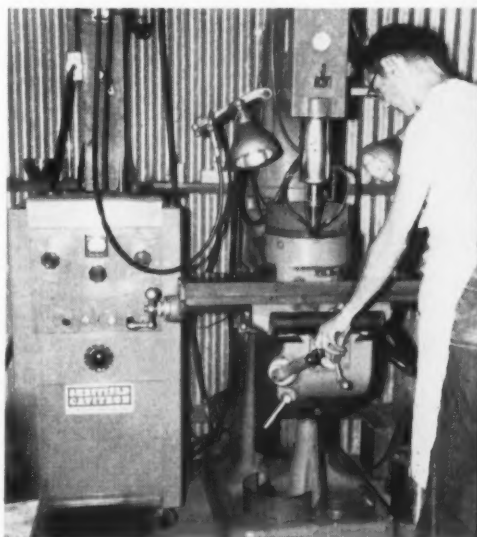
"Typical production jobs include the production of drawing dies with either solid or cored carbide inserts . . ."

it is practically impossible to do the work in any other way." He went on to say that in the current space age, dozens of materials are being used that are so hard they are extremely difficult to machine with conventional machining techniques. Here is where the ultrasonic machine enters the picture. It will cut, drill, form, slice and slot these materials, and do it while holding tolerances within 0.0001 inch.

These same few words pretty well answered the question—"Can the average job shop profit by the installation of ultrasonic machining equipment?" Only when they are called upon to do work which no other equipment in the shop can efficiently accomplish, Miller says. The ultrasonic machine is not intended to lighten the workloads of other machines. The work it accomplishes is in a class by itself and apart from conventional machine shop operations.

The specialty jobs being turned out by the L. C. Miller Company are indicative of the types of work for which the ultrasonic machine is intended. Materials being worked include germanium, sapphire, quartz, glass, tungsten carbide, silicon materials, and ferrite and other ceramic materials. Typical jobs include the production of drawing dies with either solid or cored carbide inserts in complex shapes and to finishes within 10 to 15 micro-inches. Extrusion dies made from the hardest, longest wearing materials are ultrasonic

machined into intricate shapes. Semi-conductors for transistors are machined to precision standards. This latter type of work usually includes first slicing the material into very thin wafers, then using another tool to cut hundreds of small round discs (0.019 inch in diameter) from the wafers. Other work consists of machining of glass into complex shapes, or the machining of intricate ornaments on the glass. Ceramic materials are drilled



An ultrasonic machine in operation. Power supply with its audio generator and two amplifiers is at the left. Pump for circulating the liquid carrier with the abrasive particles is visible to the left of the operator's legs. The ultrasonic machine tool, at which the operator is peering intently, is vibrating vertically at a rate of 20,000 cycles per second.

**"The machine tool itself never contacts
the material or part which it is machining . . ."**

or cut into odd and intricate shapes as required.

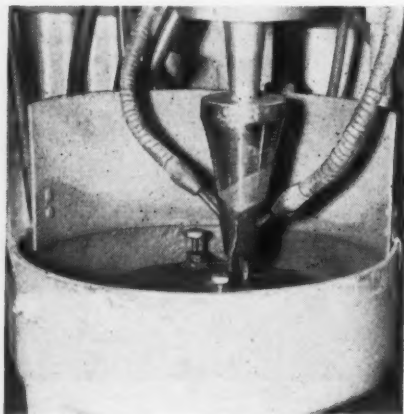
L. C. Miller himself described the ultrasonic machine and how it operates. A complete installation consists of three components — the power and frequency generator, the machine itself, and a pump for circulating the water in which the abrasives are contained. The power component contains an audio frequency generator which is tuned to the machine tool and generates a frequency of approximately 20,000 cycles per second. The audio frequency generator feeds a driver amplifier of about 10 watts capacity. The driver amplifier then feeds a

power amplifier which, on the L. C. Miller machine, has an output of 1000 watts. This high frequency, 1 kw. current is then fed into a magnetostrictive transducer or coil located in the machine head.

The magnetostrictive transducer is made up of laminations much like the core of a conventional transformer, but the material employed in these laminations tends to lengthen and shorten in phase with an alternating current passed around it. Thus, while the ultrasonic machine is operating, this transducer imparts an up and down motion to the machine tool at the rate of 20,000 cycles a second.

The machine tool itself never contacts the material it is machining. Instead, a steady stream of water containing the abrasive being used is fed between the machine tool and the work. The machine tool, on each downward stroke, strikes some of these abrasive particles contained in the liquid and drives these particles downward against the material being machined. As the abrasive particles are accelerated to about 150,000 times gravity by the impact of the machine tool, they strike the work with enough force to chip away a small amount of material. Because of this action, ultrasonic machining is sometimes referred to as vertical impact grinding.

There are a number of technicalities involved in this impact cutting or drilling action. The grit



Close-up of an ultrasonic machine head in operation. Two nozzles pour the liquid carrier with its contained abrasive particles onto the work. The tool does not contact the work-piece, but drives abrasive particles downward against the work with great force.

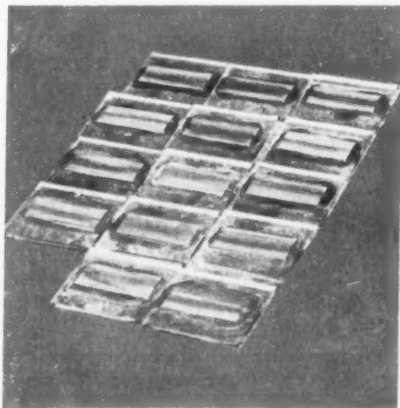
"The speed at which a workpiece can be cut depends upon its hardness and the area of the material removed."

employed is almost microscopic in size and must be harder than the material being machined. Boron carbide, silicon carbide, and aluminum oxide are commonly used grit materials. Cavitation within the water carrier of the grit causes enough turbulence of the abrasive grains so that they constantly present new cutting edges to the workpiece. The liquid serves also to float abrasives to the cutting zone and wash away particles of chipped out workpiece material. It is quite obvious that only that portion of the tool face which is parallel to the workpiece will strike the grit particles and drive them downward to perform their cutting action. Thus, the cuts in the workpiece will duplicate exactly the parallel surfaces on the tool face. Grit size has a lot to do with the tolerances obtained, with the finer grit sizes, of course, producing the finest tolerances.

The machine tool itself, because it never contacts the workpiece, need not be made of specially hard materials. Most of the tools are made from mild steel or brass. But as some wear occurs, the tool face itself is usually made up separately, then brazed onto the tool body. This makes it quite simple and economical to replace the tool face when it becomes worn.

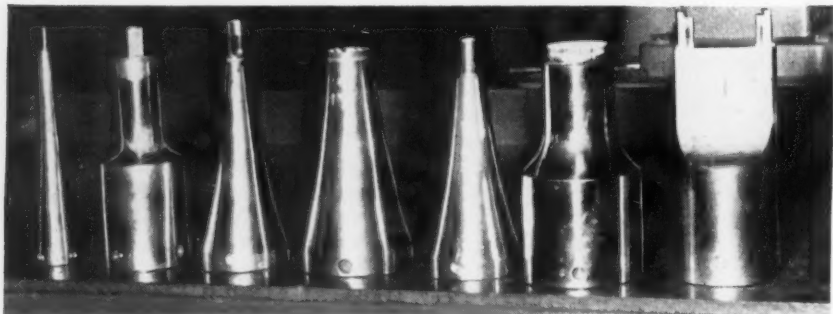
Miller pointed out that it is impractical to compare the cutting speed of an ultrasonic machine with that of more conventional machines machining more conventional mate-

rials. The speed at which a workpiece can be cut or drilled through depends both upon its hardness and the area of the material being removed. Glass cuts fastest, with tungsten carbide on the opposite end of the scale. Larger workpieces are merely clamped down on the machine table for machining, but very small pieces and wafer-thin material is usually cemented to a glass or metal base, as shown in one of the accompanying illustrations, and then the base is clamped to the work table. An optical pitch cement is used which can be easily dissolved away after the workpiece has been machined. The work table on the machine is adjustable in all



Here, thin wafers of ferrite, a ceramic material, have been cemented to glass bases in preparation for ultrasonic machining. The glass base will be clamped to the machine work table. Larger parts are clamped directly to the work table for machining.

"... installation of ultrasonic machining equipment will permit acceptance of jobs now being turned away ..."



Typical tool heads used in ultrasonic machining work. The tool faces are brazed onto the tool cones with an induction heater. Most

tools are made of either mild steel or brass. Harder materials are not required inasmuch as the tool never does contact the workpiece.

directions and equipped with precision controls.

Another one of the illustrations shows some of the tool cones with brazed on tool faces used at the L. C. Miller Company. The tool second from the right in this illustration is particularly interesting. The face of this tool, approximately 1 inch in diameter, contains 840 half-inch long stainless steel tubes set vertically to the direction of tool operation. The inside diameter of each tube is 0.019 inch. This tool, in a single machining operation, cuts 840 semi-conductor discs from a wafer-thin sheet of germanium much in the same manner that grandmother used to use a multiple cookie cutter to cut several cookies at a time from a rolled sheet of cookie dough. Each disc is 0.019 inch in diameter. When installed in the ultrasonic machine, these tools are exactly counterbalanced so that

their weight does not affect the perpendicular oscillatory motion of the magnetostrictive transducer.

L. C. Miller points out that a high frequency induction heater is a very useful tool to use in conjunction with an ultrasonic machine. "We use a high frequency induction heater for brazing on the tool face component, then tempering or hardening them after they have been brazed in place."

Thus, the ultrasonic installation at the L. C. Miller Company is very typical of the part these machines can play in a job shop operation. Summarized briefly, they are not intended to accept a portion of a conventional shop work load. They are intended instead for jobs which cannot be readily accomplished with conventional machines. The installation of ultrasonic machining equipment will permit acceptance of jobs that are now being

turned away, or home production of certain parts that are now being sublet to others. Specifically, the ultrasonic machine may be classed as a "space age" machine, and is intended for working the exotic materials which this space age demands.

If any advice was given to the owner or operator of a job shop on the installation of ultrasonic equipment, it would have to be couched in these time-worn words . . . "Why not get in on the ground floor of space age production?"

★ modern machine shop ★

56 Graded Problems in Elementary Sheet Metal Work. By Algot E. Anderson. Published by McKnight & McKnight Publishing Co., Bloomington, Ill. 144 pages, 6 $\frac{7}{8}$ x 10 inches. Cloth binding, board covers. Price, \$3.80.

This book offers an effective medium for the teaching of such basic skills as the reading of drawings, accuracy in layout, cutting, shaping and assembling. It presents projects that have proved successful in providing learning values, motivations and satisfaction. The projects are graded as to approximate difficulty and divided into seven units — simple layouts and cuts; soldered laps and seams; riveted construction; oblique lines; cylindrical forms; frustums of cones; and pyramid development and review. Each unit is designed to offer specific experiences while making practical, useful articles. The superior pupils, as well as those of average ability, have been kept in mind in the preparation of each unit.

Screw Machine Tooling Application Film

"Engineered Screw Machine Tooling Applications," a 16 mm. sound film produced by Brown & Sharpe Manufacturing Company, features eight practical applications of the latest design automatic screw machines. Utilizing close-up views and slow motion, some of the sequences detail the relative position of tooling during close timing operations. Standard and special attachments with explanations of the tool engineering involved in their practical application are featured in the film.

The film, which has a running time of 35 minutes, is available on a no-charge basis from Brown & Sharpe Manufacturing Co., Machine Tool Division, Providence 1, Rhode Island, and from local Machine Tool Division sales offices.



LET AN AUTHORITY TELL YOU



How to Solve Your Supervisory Problems

By ALFRED M. COOPER

Contributing Editor, Modern Machine Shop

Q. How may the foreman or office supervisor cooperate best with the plant training division?

A. When all training is carried on by instructors from the plant training division the supervisors should keep informed of the courses being taught, and when possible visit an occasional class. Thereafter, the supervisor should encourage his subordinates to study, and show them how to apply on the job what they have learned in class. This applies equally to job training, instruction in accident prevention, and public contact training.

The training divisions in turn should keep the shop and office supervisors fully informed regarding all employee training and should encourage criticism and suggestions from the supervisors. The supervisors should never speak disparagingly of any training program, either to a subordinate, or in the hearing of a subordinate.

Q. How does the supervisor's responsibility differ when plant train-

ing is carried on partly by training division instructors and partly by the production supervisors, in the form of on-the-job instruction?

A. The supervisor here has the dual responsibility of keeping informed on the work the training division is doing, and also learning to analyse the jobs he is teaching, arrange operations into a proper instructional sequence, and then teach these operations effectively by telling, showing, practice, and testing.

It sometimes happens that a supervisor who has been critical of training carried on in his department by training division instructors becomes more tolerant and co-operative after he has begun to actively participate in training work. Good training results only when considerable thought and effort goes into the program, and a supervisor who is himself an effective teacher appreciates the need for close cooperation between training and production departments.

For answers to your perplexing managerial problems address your letters to:
Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio.

Q. What is the supervisor's responsibility when management feels that all employee training may best be carried on by the production supervisors under the direction of the training supervisor?

A. This situation is somewhat unusual, but may exist when job training is limited to breaking in new workers, and no apprenticeship training is in effect.

In one organization employing 10,000 people, for example, the only craft training was that in salesmanship, and both elementary and advanced sales training classes were taught by sales supervisors. In addition, supervisory training, public relations training and accident prevention training were taught by conference method by the direct superiors of the employees requiring this instruction.

Q. What is the rule that determines whether instruction in any instance should be given by conventional lecture-demonstration method or by conference method?

A. Lecture-demonstration method is always preferable when discussions can be based on matters known to be within the experience of the student. Thus, a public-contact employee may profit by discussing employee-customer contacts and methods of improving the final effect of such contacts, in terms of bettering the company's public relations.

Likewise, any group employed in a hazardous occupation has a great fund of experience from which to draw when discussing methods of reducing injuries.

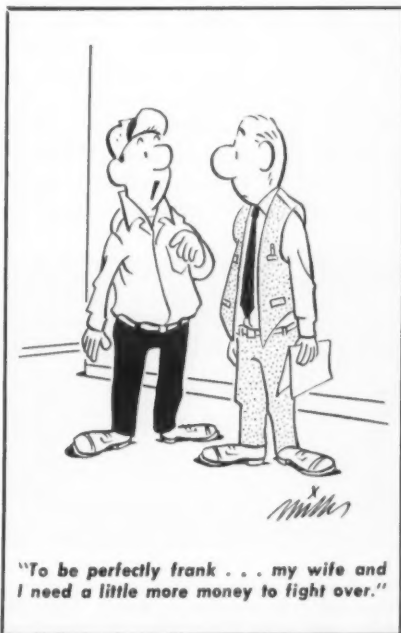
Since 1914, conference method has proved most successful in im-

proving supervision, when the training groups are made up of experienced supervisors.

Q. What are the two forms of on-the-job training?

A. Vestibule or induction training for new employees, and upgrading training for older employees. In the first instance a formal but brief course is taught by the supervisor, with the sole purpose of qualifying the employee as a semi-skilled worker.

Upgrading training probably will be carried on more or less piecemeal, in terms of the needs of the subordinates. The supervisor is the best judge of these needs. Special training of employees often is required when a new type of machine is put into operation in the plant.



How to Fasten Thin Material with Flat Head Machine Screws

A number of methods for assembling thin materials or parts to machine castings, and so on, are illustrated and described.

By FRED ROGERS

When thin pieces of steel or other materials are to be fastened to machine castings, more especially where a flush assembly is required, flat head cap screws are widely used. These screws are either of the slotted type or those having a hexagonal socket in the head. By thin pieces it is meant such parts as graduated scales, both straight and circular; pieces made of strip stock; belt, chain and gear guards

made of sheet steel; thin covers; wrought steel and brass hinges; some types of cast name, legend and information plates and other pieces of similar design. If these parts are not fastened securely, a metallic jingle may occur when the machine is in operation. Worse still when a graduated or calibrated scale is involved, adjustments may be made inaccurately. If looseness develops in such parts, the mechanic

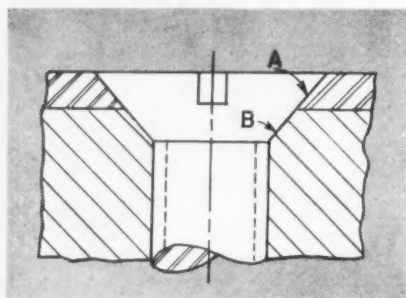


Fig. 1—The usual method of assembling thin parts to castings is shown herewith and is ordinarily shown thus on drawings.

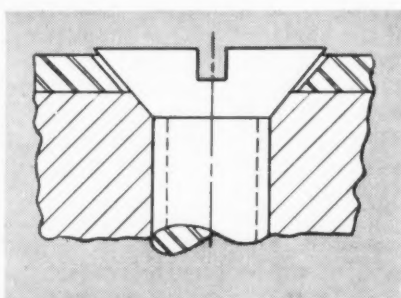


Fig. 2—A situation might develop where the screw head bears against the casting but does not bear against the thin piece.

"A situation might develop where the head bears against the casting but does not contact the thin piece."

will do well to thoroughly investigate how these pieces were originally assembled.

The usual method of assembling thin parts to castings, and so on, is shown in Fig. 1 and is ordinarily indicated thus on assembly drawings. The draftsman assumes that the screw head will bear at both *A* and *B* simultaneously and leaves it up to the man in the shop to get the proper results. If the two mating parts are not jig-drilled, then the 82-degree included angle hole for the screw head is drilled and countersunk at the same time during the assembling process. When the screw is inserted, it may or may not tighten or secure the two pieces together. A situation might develop as shown in Fig. 2 where the head bears against the casting but does not contact the thin piece.

Indeed, the final assembly may appear as the sketch in Fig. 3 where the screw has not been threaded

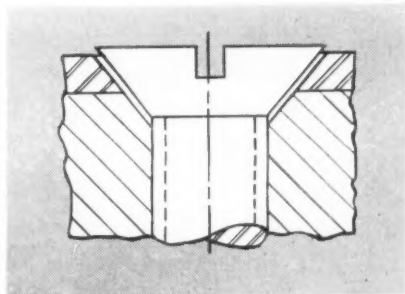


Fig. 3—The final assembly may appear as shown here, where the screw has not been threaded with perfect threads up to the head.

with perfect threads up to the head. It is often difficult to produce such threads and this can be appreciated when one considers how they are machined. Usually, a very short screw only is required. Flat head cap screws are measured overall. If a threaded length equal to one diameter is sufficient to hold the pieces, then the thickness of the held part plus the head height

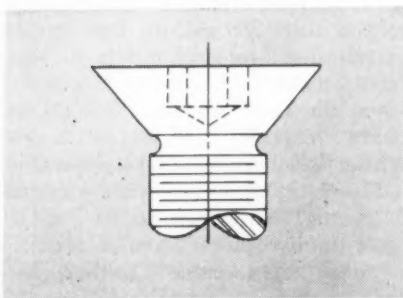


Fig. 4—This illustration shows a method of necking the screw to eliminate the imperfect thread directly under the head.

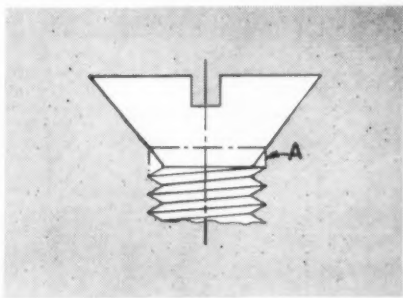


Fig. 5—Another method of eliminating the imperfect thread directly under the head of the screw is depicted in this sketch.

"Two methods of undercutting have been used to eliminate the imperfect thread directly under the screw head."

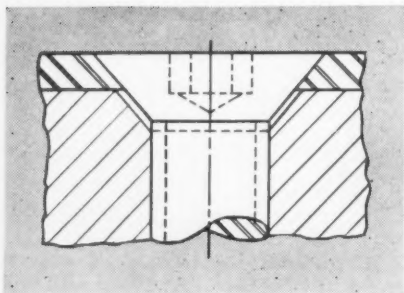


Fig. 6—After both the pieces have been drilled and countersunk together, the thin piece is removed and then the hole in the mating part is recountersunk slightly deeper and larger in diameter as illustrated.

usually makes a comparatively short screw. The throat of the thread chaser might be from 20 to 30 degrees which, in itself, precludes the possibility of threading close to the screw head. If a body diameter counterboring operation is not per-

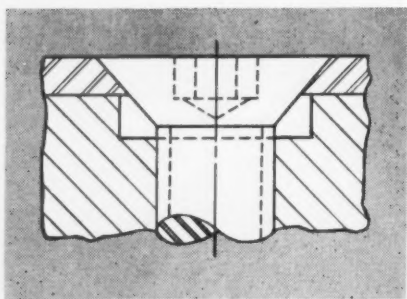


Fig. 7—In this instance, the hole in the casting is counterbored instead of being countersunk for the purpose of accommodating imperfect threads under the screw head.

formed, then a condition similar to that clearly illustrated in Fig. 3 may be expected.

To avoid this faulty assembly, screws have been rethreaded with a no-throat set of chasers after they have been annealed. They were thereafter heat treated again.

Two methods of undercutting, necking or relieving the thread have been used to eliminate the imperfect thread directly under the screw head. These are shown in Figs. 4 and 5. In Fig. 4, a half round tool point is used, making a cut depth equal to that of the thread depth. The upper edge of the tool coincides with the lower edge of a standard height screw head. In Fig. 5, a pointed tool is used to shave the head at the same angle to the bottom of the perfect thread. Thus, a small triangle of metal is removed as at A which is in reality only imperfect threads left by the ends of the thread chasers. While both of these methods gave satisfactory results, the operation was time-consuming. Holding the head end in a chuck was not satisfactory since the head was too difficult to clamp. A special type of collet chuck with a threaded hole had to be made.

However, there are other ways to overcome this difficulty. In Fig. 6, after the two pieces have been drilled and countersunk together, the thin piece is removed and the hole in the mating part is recountersunk slightly deeper and larger in diameter. However, the thread must be

"The depth of this counterbore would be such as to accommodate imperfect threads under the screw head."

perfect, close to the lower side of the screw head, otherwise the same condition exists as in Fig. 3.

A very satisfactory solution is shown in Fig. 7. The hole in the casting is counterbored instead of being countersunk. The depth of this counterbore would be such as to accommodate imperfect threads under the screw head. The diameter of the counterbored hole will depend on the thickness of the held member and the diameter of the screw body and head. If both parts can be jig drilled, the various operations of drilling and counter-sinking the thin piece and drilling, counterboring and tapping the casting can be performed at one setting. If, however, they are drilled when clamped together during the assembling operation, then a separate operation is necessary when counterboring the parts.

Figure 8 illustrates a very thin piece assembled by the type of screw just mentioned. The thickness of the piece is approximately one-third that of the thickness of the screw head. In this instance, both pieces were drilled separately, not in a jig but by the layout method. The diameter of the counterbore is quite large but it is such as to allow for minor discrepancies in scale measurements. The dotted lines show what might be expected in off-center holes when this method is used.

In Fig. 9, the thin or attached member has a thickness equal to or

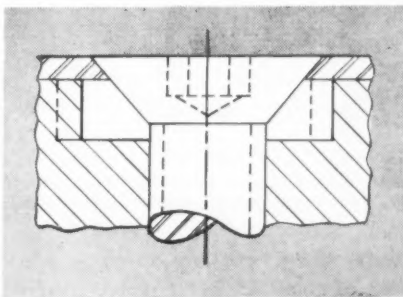


Fig. 8—This sketch shows a very thin piece assembled to a casting. In this case, both pieces were drilled separately with the casting being counterbored to allow for minor discrepancies in scale measurements.

approximately the same as the screw head thickness. On the left of the center line a countersink is shown, and on the right is a counterbore, the depth of each taking care of imperfect threads.

Ordinarily, the methods used in the foregoing examples require the

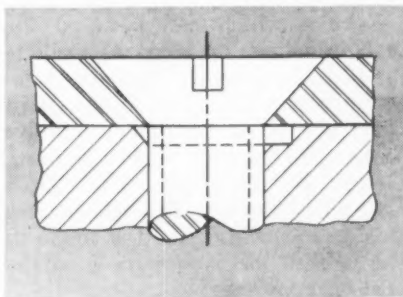


Fig. 9—In the assembly method shown in this sketch, the thin or attached member has a thickness equal to or approximately the same as the thickness of the screw head.

"A combination center drill is on the market which tap-drills, countersinks and relieves in one operation."

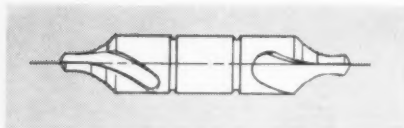


Fig. 10—This sketch shows a combination center drill which is designed to tap-drill or body drill countersinks for the screw head and relieve in one operation.

use of two tools; namely, a drill and a countersink or counterbore, other than the tap. If the work is done on a drilling machine, possibly two spindles are necessary or at least the tools must be changed if a single spindle is used. The same changing of tools is necessary if a power driven hand drill is used when assembling takes place.

A combination center drill is on the market which tap-drills or body drills, countersinks for the screw head, and relieves in one operation. Known as Type S Ring-Seat center drill, it is a dual purpose tool which can be used for machining center holes as well as for flat and oval head machine screw holes. This drill is shown in Fig. 10. It is manufactured by Link Industries, 13841 Elmira, Detroit 27, Michigan. The DoAll Co., Des Plaines, Ill. also makes this type center drill. It is made in the various sizes obtainable in the customary 60-degree center-drill. An enlarged view of a portion of the drill is shown in Fig. 11. The body tapers off at 82-degree included angle into a 60-degree included

angle, finally blending into the drilling end. This end is relieved lengthwise, as shown, with a curved periphery inside the dot and dash lines.

An assembled view of a screw in a hole drilled and countersunk with the above described tool is shown in Fig. 12. The 60-degree relief shown in the sketch extends from just above the lower surface of the held piece downwards well beyond where the head and body of the screw join. The two rings which are shown in the tool body in Fig. 10 are so placed for locating and re-sharpening operations.

The proportions used in these

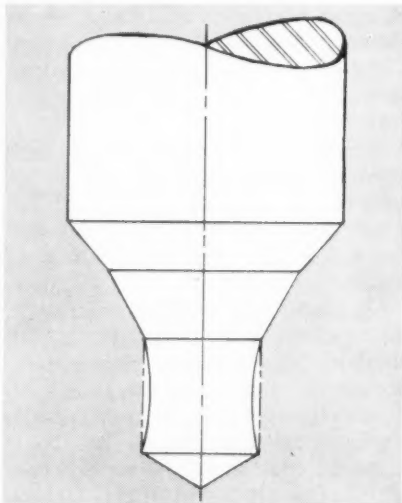


Fig. 11—An enlarged view of one cutting end of the combination center drill illustrated in Fig. 10 is presented herewith.

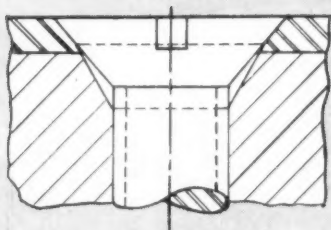


Fig. 12—This sketch shows an assembled view of a screw in a hole which has been drilled and countersunk with a center drill of the type that is illustrated in Fig. 10.

sketches are for a standard 5/16-inch diameter screw having a 5/8-inch diameter head, approximately 3/16 inch in height. The thickness of the held member is 3/32 inch in Figs. 1, 2, 3, 6, 7, and 12. In Fig. 8, the work thickness is 1/16 inch, while the work thickness shown in Fig. 9 is 3/16 inch.

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Thread Rolling Film

A 16 mm. film in color with sound on the Landis Lanhydrol Thread Rolling Machine has been completed by the Landis Machine Company. Of 20-minute duration, the film explains in detail, with illustrations and narration, the three methods of rolling ("Infeed," "Continuous" and "Thrufeed") by which the machine can be used for thread gear rolling. In addition, the film shows nine applications, rolling as many different workpieces to illustrate the utility value and versatility of the machine. It also highlights the unique automatic tooling that has been developed to handle

effectively the varied designs of workpieces shown.

The film is available by contacting Advertising Department, Landis Machine Co., Waynesboro, Pa.

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Stainless Steel Products and Services.

The Committee of Stainless Steel Producers, American Iron and Steel Institute, has published a reference manual entitled "Buyers' Guide for Stainless Steel Products and Services." This 159-page book lists approximately 3,000 firms which make products of stainless steel or offer services pertaining to stainless steel. In addition, the book provides a special table giving names and addresses of mill suppliers and the mill forms and shapes which they produce.

Copies of the guide are available in limited quantities without charge from The Committee of Stainless Steel Producers, American Iron and Steel Institute, 150 East 42nd Street, New York 17, New York.



"Try kicking it. Sometimes that helps."

THE SUPERVISOR AND HIS BOSS

The industrial supervisor is an integral part of management and cannot straddle the gap that separates management and worker.

By ALFRED M. COOPER
Contributing Editor, Modern Machine Shop

We have been referring to the industrial supervisor so long as "the key man of industry" that we sometimes forget what his real job is. The truth of the matter is, I have never met a foreman or straw boss who rated himself as "key man" of anything.

Time was when such terminology was successful in encouraging the industrial supervisor—should such encouragement be essential. Today's foreman knows pretty well what the score is and exactly what his job is. If he doesn't, he can't stay around very long.

As near as I have been able to judge, this "key man" we have been talking about for the past two decades was supposed to be a sort of liaison officer, interpreting wishes of management to the work force,

while at the same time he told management what the worker had on his mind. The difficulty here, as every supervisor knows, lies in the fact that the supervisor has, by this time, become an integral part of management—if he is worth his salt to anyone—and it is impossible for a man in this particular situation to straddle the great gap that inevitably separates management and worker.

The supervisor is aware of this fact, perhaps to a greater extent than anyone else, since he has had to fight his way up, step by step, from a workman's berth to managerial, perhaps sub-managerial, status. This is the most difficult transition anyone ever makes in industry; engineers are, of course, created in colleges; executives are chosen from

"Most foremen I know would very much like to remain on an equal footing with their subordinates . . ."

among engineers and the cream of the supervisory force.

I have known foremen who conceived that they owed equal allegiance, both to those reporting to them and to management. These men attempted to proceed on this theory; for a time they were successful, but sooner or later a situation would arise in which they found they must make up their minds exactly where their primary loyalty lay. If they continued to straddle an imaginary fence they soon found themselves in serious trouble; if they had learn that they were indeed "junior executives," as management decreed, and had acted accordingly, they, of course, came through with flying colors.

This is not a matter of theory or of any foreman's preference. It simply happens that there does exist a sharp dividing line between workman and foreman, just as there exists another and almost as sharp a dividing line between a foreman and his superintendent or works manager. And no one knows this better than the foreman who has been successful in leaping the first hurdles to success, probably those of straw boss and assistant foreman. (No one knows this except, of course, the foreman and those workmen who report to him.)

Most foremen I know would very much like to remain on an equal footing with their subordinates, at least insofar as actual appearances go. They do not take themselves too

seriously even though they *do* take their jobs seriously. They have worked alongside these men for years — perhaps even for decades. They like these artisans, respect their ability, and in turn are liked and respected by their subordinates. But they no longer belong to that group. They know it and their subordinates know it. They are a part of *management* and therefore never again can meet on an equal footing, even with those who were their best friends when they worked alongside them.

This is altogether as it should be, but it does not make a foreman's position easier. He knows that his job is that of getting out "production, production, production" (as Wendell Willkie once put it), and



"...it is impossible for a man in this particular situation to straddle the great gap that inevitably separates management and workers."

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"His job also is that of getting out production and nobody is surprised if he lops off a few heads . . ."

this regardless of old ties or personal preferences. Inevitably, he finds it necessary, time and again, to call a friend of years' standing into his office and lay down the law to him. *This is certainly not a pleasant experience for the old friend and most assuredly it is a bitter experience for the foreman.*

But when the only real goal is production of top quality and quantity, there simply is not much room for friendship. Thus, the foreman becomes a genuine key man—for management. He cannot and must not overlook any slackness in effort on the part of his old cronies.

When he was himself a workman he had no such problems; even later, as an executive of higher rank, he will have no such problems. No-

body expects a superintendent to be on familiar terms with his thousands of subordinates; he may, and probably will be kind, just, and fair in treating these people, but he will never become intimate with them. His job also is that of getting out production, and nobody is surprised if he lops off a few heads, even in the supervisory force, in order to attain a specific quota.

The foreman's problem is different. He may have but recently been appointed to supervisory rank, and he is well-known and liked by everybody with whom he has been working. These people know him, as they never know a higher executive, and at times certain of them may resent any disciplinary action he may take when their work falls off.

This foreman probably knows the worker and probably his wife and family, and is fully aware of his problems, financial and otherwise. All of his tendencies are to gloss over the shortcomings of these old friends of his. The difficulty is that, should he make a practice of excusing sloppy work, *even in the case of but one man*, he cannot, in all fairness, crack down on another worker who, for any of a score of perfectly good reasons, later is guilty of turning out substandard work.

This is often the foreman's dilemma. He is unquestionably a good Joe; he knows exactly the problems of everyone reporting to him. *But his primary fealty now must be given to one man only —*



"This is certainly not a pleasant experience for the old friend and most assuredly it is a bitter experience for the foreman."

"... you can't be intimate with subordinates and a respected boss at the same time ..."

his immediate superior. Sometimes he finds it absolutely essential to disagree privately with this individual on a number of matters relating to the people reporting to him; *but when the chips are down he must obey this superior's orders.*

I have never known a foreman with as much as six months' experience who had not discovered this verity for himself. It is absolutely impossible to be at the same time "one of the boys" and the boss man over those same "boys."

Foremen have *attempted* this dual role, but it leads only to trouble for them. We all like to be popular, and the foreman who does not *like* his subordinates is not much of a supervisor. But if he permits this liking to sway his judgment in matters pertaining to production, he simply is not around very long.

This does not mean that he must get tough with subordinates; it simply means that he is now no longer one of them, and the quicker he and they are aware of this the better.

It is not that this industrial foreman enjoys pushing subordinates about, but he somehow learned—probably the hard way — *that you can't be intimate with subordinates and a respected boss at the same time.* Many supervisors have attempted this and found that those supervised did not thereafter come through with everything they had when the going became rough.

This is why I am somewhat skeptical of the use of that term "key

man" on foremen—even though I often use it myself. Frankly, I do not know exactly what a "key man" is, nor do I believe the average foreman knows. The way it works out is something like this:

A workman who shows unusual potential as a leader is selected by management and given some sort of minor supervisory job. The pay is better, and he has conferred upon him other perquisites that set him *apart* from the workmen. In the beginning he is a leaderman or straw boss, and of course he is always under careful supervision during this period of transition. He still likes to think of himself as one of the boys, and may resent any attitude on the part of a workman that indicates he is not.



"Sometimes he finds it essential to disagree privately with this individual ... but when the chips are down he must obey orders."



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"... it is imperative that we wake up to the fact that he is no longer a member of the work force."

He thinks in terms of getting out production, but he believes this can be done without opening any schism between himself and his former friends.

Then one thing after another occurs which makes it imperative that he wake up to the fact that he is no longer a member of the work force; that he is a part of management. He is smart, and probably runs smack into a series of situations that proves to himself that he has moved up into another echelon, whether he likes it or not. He has the same *feeling* toward his former friends, but comes to appreciate that he cannot, in all fairness to management, continue to be one of the boys. He no longer punches a time clock; he has a special parking place for his car; he is often called

in to attend various meetings of management.

Those reporting to him are often quicker to realize that he is no longer one of them; that his job now is to supervise, that he is a member of the management team. They no longer consider him as one of themselves. *If he is to succeed in the new job he reluctantly severs old ties, and the workers are the first to accept this new situation.*

Occasionally he will try to straddle, until he finds this to be utterly impossible. He wishes to be kind, fair, and just in his dealings with his subordinates, yet maintain his old friendly status with them. It may well be that again the workers will be the first to appreciate his error. Thereafter, he must either ask management to return him to his old job (which is a very bad move for him), or he must align himself solidly with management. It is then that he *looks ahead* at the supervisory and executive jobs beyond and admits to himself that he has willy-nilly broken all connection with the work force. He will do this if he is smart. He may very well consider seriously the works manager's job. He knows he is now a part of management, and no matter how many buddies he had as a workman, his future now lies with the managerial forces.

Somewhere along here this supervisor begins to study the man to whom he directly reports—probably an executive who has earlier been



"... you can't be intimate with subordinates and a respected boss at the same time ..."

**"There can be no turning back now;
he can never go back to his old job as workman."**

through this identical experience. And this is how our industrial executives are made.

The chances are that this superior is of the right type; that he has not permitted success to interfere with his work. This is extremely important, because the supervisor in question is now going to follow painstakingly in this man's footsteps.

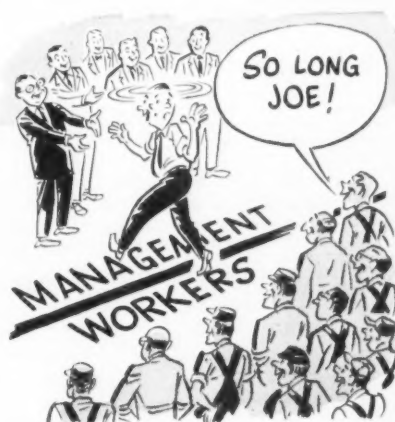
I have known of a few cases in which the executive was not of the right type, and the foreman, using this man as a model, either went wrong or had trouble in getting himself straightened out. Every careful observer has seen this happen. Usually, however, the executive to whom the foreman reports is solid, smart, and dependable; *he thus will become an excellent model for this supervisor to emulate.* The supervisor studies him and his methods, discusses his problems with him, and learns much. And all of this is good. In such case, the supervisor soon develops into real executive material.

The point is that the supervisor has now learned that he has no connection with the work force other than as a boss, and appreciates that his future lies with those of executive rank. There can be no turning about now; he can never go back to his old job as workman; he is on the way up. Most executives tell me that there is nothing simple about demoting a supervisor; that he may remain where he is, go much farther up—

or, in all probability, be dropped from the payroll. Apparently, any man who has been a supervisor for any time never works out as an artisan again.

However, at this point the supervisor is again studied by the top brass. The question is, exactly how much responsibility can he safely assume? Thus, we find foremen who are good foremen for life, and again we find foremen who consider this job as temporary. The latter expect to develop into general foremen or superintendent, and after that the sky is the limit. We have, today, many great men in industry who started as foremen. Or a foreman may become a general foreman and be content to stay in that position for the rest of his working days.

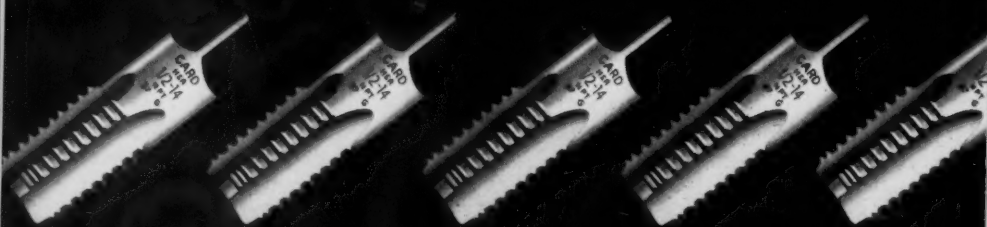
Any man who has reached the



"If he is to succeed he severs old ties and the workers are the first to accept this . . ."



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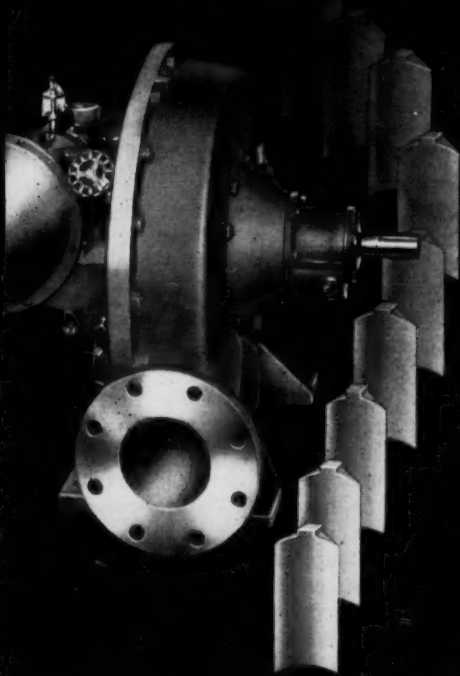
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"Once a foreman learns that he is part of management he begins to think like management."

rank of foreman or general foreman can decide how much farther he wishes to go. If he is ambitious, as I have said, the sky is the limit. But many excellent men are content with the salary and perquisites of a foreman's job and decide not to go higher—may even refuse further advancement when it is offered them. I knew one case in which such a foreman was also an amazingly successful real estate speculator in his spare time and was worth more than a million dollars. He positively refused further advancement; nevertheless he remained a top-notch foreman.

This is the only millionaire foreman I have known and I doubt if there are many of them about. (Incidentally, this fellow was scrupulously honest and never made any slightest show of his wealth. On the job—he ran a large punch-press department—he simply tried to turn out a good production job every day.) But he had no desire to advance to executive rank.

Once a foreman learns that he is part of management he begins to think like management. This does not mean that he gets tough with anybody; rather, he begins to try to get a more comprehensive picture of what his company is trying to do, how well it is succeeding, and to what extent his own efforts are contributing to the company's success. That is the point at which he ceases forever to think like a worker. He studies everything from man-

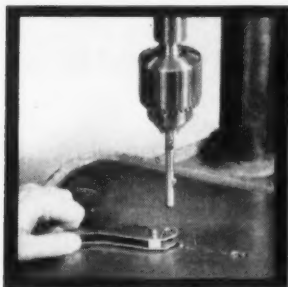
agement's viewpoint. *Actually, a man may be a supervisor for two years before this metamorphosis takes place.*

There is one possible exception here, and most of us have encountered this at one time or another. This is the foreman who, from the standpoint of his subordinates, is an excellent boss. But for some reason this man has taken a definite dislike to someone higher up (perhaps to the entire management), and thereafter trouble begins to build up in his department.

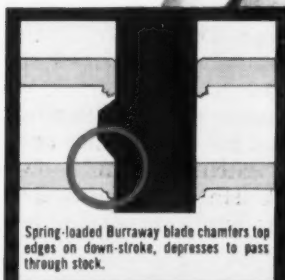
This foreman deliberately sets about developing a group of subordinates who are absolutely loyal to *him*, but who have been taught that management is not working in their interests. As a result, he builds up a little kingdom of his own, in



"... executive to whom the foreman reports will become excellent model for supervisor."



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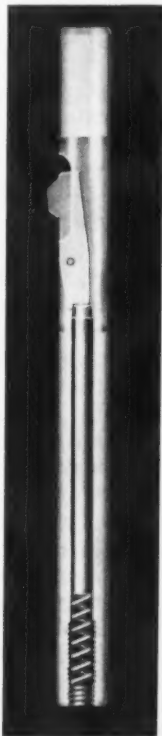
One pass of the Cogsdill Burraway tool chamfers four hole edges on this stamped handle. The job previously required four separate passes—two with a right-angle chamfer, two with a standard tool.

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"When a foreman identifies himself solidly with management he begins studying his own boss . . ."



"... a man will be supervisor for two years before this metamorphosis takes place."

which every subordinate is loyal to him personally, and disloyal, not only to management, but to every other department in the plant.

Such a foreman can cause a lot of trouble. He repeatedly tells his subordinates that *his own superior* is incompetent, and of course they take his word for this. *He also tells them to have as little as possible to do with the workers in other departments*, and sets them an example by refusing to cooperate with any of his brother supervisors.

This man's production record may be excellent, but he nevertheless is injuring both management and his own subordinates. The problems must be solved by his immediate superior. If there is any legitimate cause for his attitude it must be cleared up at once. If there is

not (and this is usually the case) then the superior is certainly remiss if he leaves the man in charge of that department.

When a foreman identifies himself solidly with management he begins studying his own boss (probably a general foreman) more closely. He realizes this superior has gone through this phase of growth several years earlier; he also appreciates now, for the first time, why this man approaches problems from a different angle than the foreman has been doing. That is the day the foreman definitely becomes executive material.

The foreman now understands what it is that his superior has been waiting and watching for in his own development. He appreciates that no one wants him to become either



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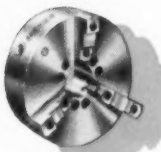
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"Executives, according to all the records, have not yet learned to take care of themselves physically."

hardboiled or wishy-washy. His superiors simply desire positive proof that he has made the transition and is now ready for promotion to executive rank.

There is nothing whatever wrong with the worker's attitude toward his job; there is certainly nothing at all wrong with the supervisor's view of *his* job. It merely happens that neither of these viewpoints coincide with the executive outlook. All three are essential in any industrial democracy such as ours. The point is that each is different, and the new executive will be chosen from among those supervisors who have succeeded in completing the transition.

It is as simple as that, yet *management's greatest headache often*

is that of finding a supervisor who has developed to the point where he can safely assume full managerial responsibility. In a fluid industrial world like ours this search for competent executive talent goes on continuously.

There are several reasons for this, and some of them may be unpleasant. Executives, according to all the records, have not yet learned to take care of themselves physically. In such times as these, they work under increasing stress, and far too many die before 60. Again, thousands of executives must retire each year, and plant expansion always demands new battalions of competent executives. In our opinion, there is only one proper place to look for such men and that is in the plant's supervisory force.



"... management's greatest headache often is that of finding a supervisor who can safely assume full managerial responsibility."

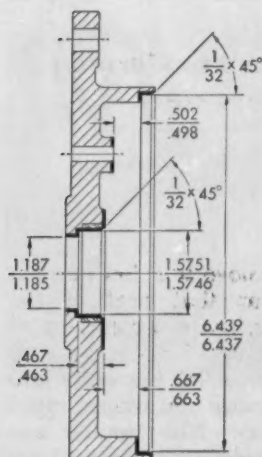
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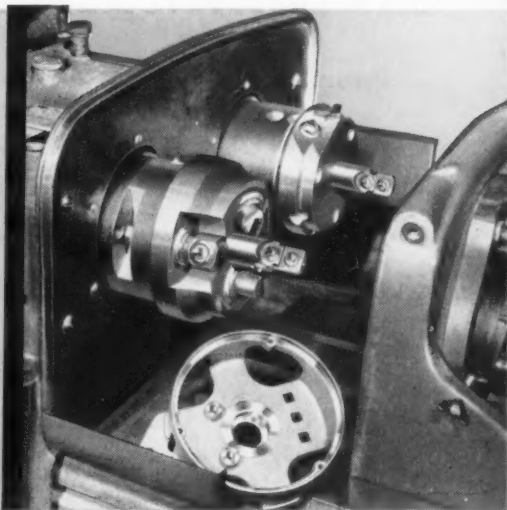
Revised Edition. By S. E. Rusinoff. Published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. 565 pages. Cloth binding, board covers. Price, \$6.25.

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A CASE HISTORY—

Machining Stainless Steel

Poor tool life was encountered when box-turning 1 1/4-inch round Type 304 stainless steel.

By G. J. STEVENS
Machining Engineer, Armco Steel Corporation

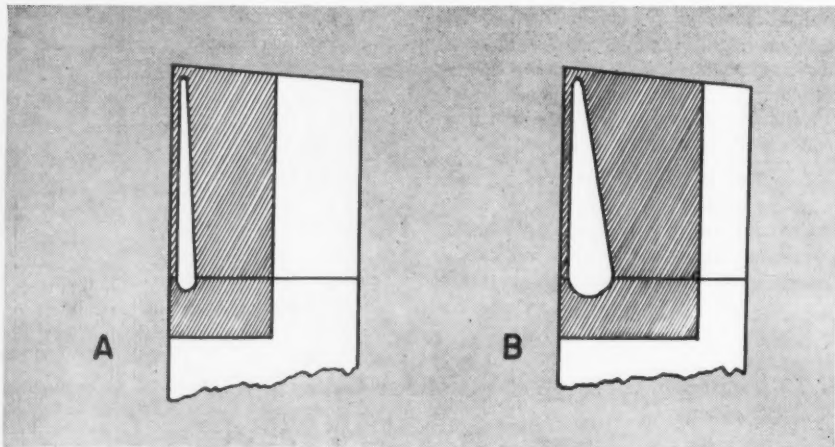
Problem:

A shop ran into short carbide tool life and excessive tool breakage when box turning Type 304 stainless steel in a turret lathe. The bar stock was being turned at 300 f.p.m., using a 0.012-inch feed per revolution rate with a 0.187-inch depth of cut.

Solution:

Upon inspecting the cutter, the machine engineer noted that the

chip curler groove was too narrow, particularly at that part of the groove cutting the outer surface of the bar (see A of accompanying sketch). It crowded the chip into the narrow groove and caused rapid tool breakdown. The trouble was remedied by grinding the tool, as shown at B in the sketch, with a chip curler large enough to quickly and easily accommodate the feed rate which was being employed.



(A) Narrow chip curler groove caused rapid tool wear. (B) Grinding the tool with a chip curler large enough to accommodate the feed rate being used remedied the trouble.



Easily grinds irregular shaped perforators concentric with shank within $\pm .0002$ accuracy. Also, can be used for light milling and boring fixture, inspection tool, etc.

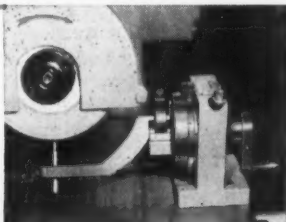
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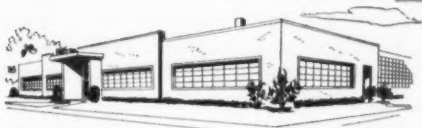


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March, 1959

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*Techniques for increasing output with
newly developed machines and tools.*

Versatile Small Millers Perform High-Production Operations at Ford Plant

The small milling machine, vital to many a low-production or toolroom facility in the past, is now making its mark in high-production applications throughout the United States. One of the most impressive such cases is the use of five U.S. Hy-Flex milling machines as an integral part of the production lines at the new Sharonville, Ohio, plant of the Ford Motor Company's

Transmission and Chassis Division, one of the most highly-automated plants in the world.

The Hy-Flex machines were chosen primarily because they provided all the precision, automation and power required to perform the desired functions. Equipped with electrically controlled hydraulic table feed cycle, the Hy-Flex mills keep pace with "giants" of metal-working, often just a few feet away. Another reason for the Hy-Flex choice was their versatility. Hy-Flex construction permits ordering only the required features, yet allows easy retooling in the field for model changes. Unit construction for building block assembly permits individual treatment of each specific application. For Ford production, the small mill is equipped with two spindles which can be positioned as required. This allows multiple operations on one part or machining of two parts simultaneously. Both setups are used in the Ford plant. The single-column Hy-Flex can be equipped with as many as three spindles.

A detailed review of the Hy-Flex operations will indicate the scope of work that can be effectively accom-

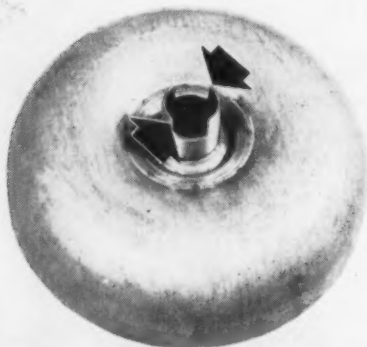


Fig. 1—Impeller converter assembly. Arrows indicate surfaces milled with Hy-Flex machine.

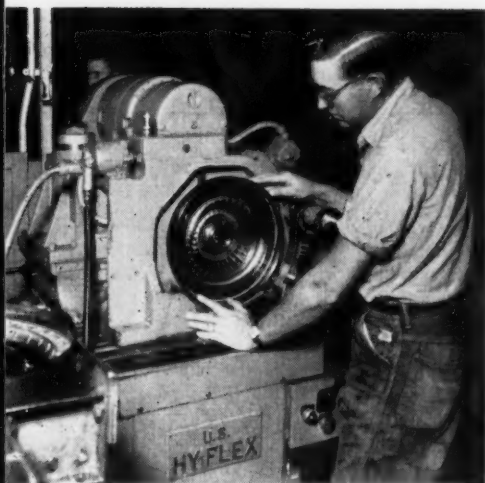


Fig. 2—Operator unloads part from mill after machining surfaces designated in Fig. 1.

plished on these highly versatile machine tools.

Impeller Assembly Converter (12-Inch)

Material: steel tubing, Rockwell "C", minimum reading of 30

Purpose: mill drive slots

Production Rate: 715 pieces in 8-hour period

Spindle speed: 2600 r.p.m.

Feed per revolution: 0.0028 inch

Cycle time: 0.1915

The part (Fig. 1) is conveyed along the production line from previous operation—broaching of the slots. Two single-column Hy-Flex machines are utilized to double the capacity of this station. The Hy-Flex mills the drive surfaces on the pump driving lugs radially in line to the center of the impeller converter, with in-line tolerances of 0.003 inch. This provides better drive to the front pump. The slots

are each milled 0.690 inch deep and then curved into the bottom of the slot with a $\frac{1}{8}$ inch radius. The angle which is milled is 40 degrees 20 minutes.

The operator loads the part in the fixture and then brings swing clamp into position, which automatically actuates air cylinders to clamp part against locator and clamp in bushing. He then throws "Start" lever to cycle machine. Machine starts in "feed", then goes into rapid traverse, then back to feed, then stops and unclamps part. Operator then moves swing clamp to unload part (Fig. 2).

In order to accomplish the job in one cycle, the milling operation of one spindle is conventional, the other is climb milling; yet, accuracy is maintained throughout. The cutter used is a $\frac{1}{2}$ inch diameter carbide, right-hand cut, left-hand spiral end mill.

Part goes from Hy-Flex to burr-removal operation where outer

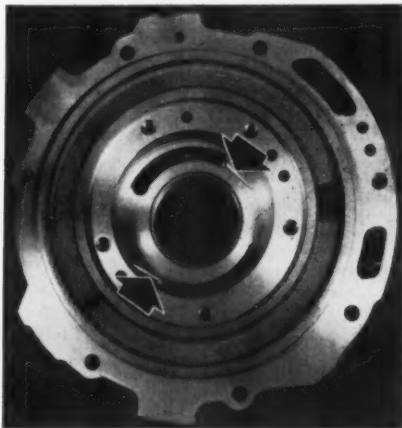


Fig. 3—Front pump. Arrows indicate grooves cut in rotor pocket to smooth out pump action.

More Production . . .

diameter of hub is machined to a 7 micro for an exceedingly fine finish. Basic dimensions of the part are: overall diameter (outside), 12½ inches; overall depth, 4.324 to 4.320 inches; outer diameter of tubing, 1.9975 to 1.9962 inches; depth of broached slots, 0.690 inch; width of broached slot, 1.13 inch.

A similar operation is performed by the Hy-Flex on the 12-5/16 inch impeller assembly converter, where the production rate is also 715 pieces in an 8 hour period.

Body Assembly—Front Pump

Material: cast iron, Brinell hardness 163-207

Purpose: end mill square groove and angular groove in bottom of rotor pocket

Spindle speed: 1800 r.p.m.

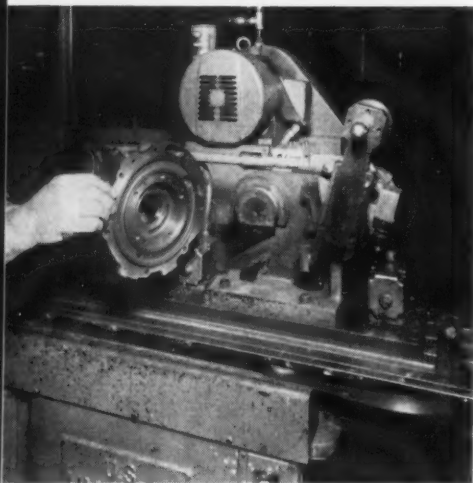


Fig. 4—Part is mounted in Hy-Flex mill for machining the grooves indicated in Fig. 3.

Production rate: 1400 pieces in 8-hour period per machine

Cycle time: 0.018 (two workpieces at a time)

Grooves are milled in front pump (Fig. 3) to smooth out the pump action. This is a slipper type pump with seven slippers that pick up and discharge oil after pressurizing it. Originally the seven discharges per revolution created a pulsing action. This was eliminated by the addition of the grooves which permit oil to slip back into the next chamber. One groove is 7/8 inch long and the other groove is 1 inch long. The grooves are tapered, with the tolerance of tapered depth being 0.007-0.009 inch, and shallow end, 0-0.004 inch.

Operator mounts two parts (Fig. 4) and then swings arms down, at which time the parts are automatically clamped. He then pushes cycle button; machine automatically goes into cycle, mills groove on each of the parts and automatically unclamps. Operator lifts arms and removes parts. Similar operation takes place on second Hy-Flex to mill second groove on two parts at one time.

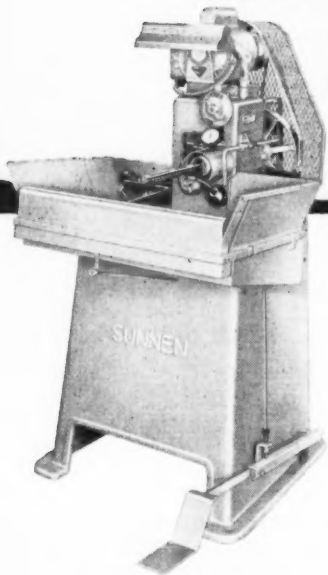
Milling of the grooves completes machining operations on the part. It comes to this station from a precision machining operation where mounting diameters and rotor pockets are machined. From this station, part moves to "liquid honing" operation.

The single-column U.S. Hy-Flex is also used to finish mill a "fish-tail" groove in the rotor pocket of the rear pump. Material and production rate are the same as for the front pump.

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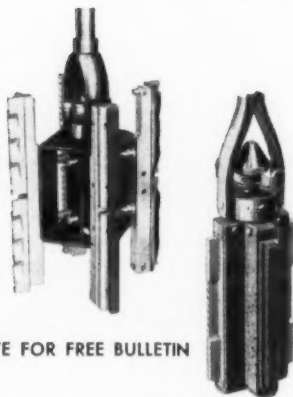
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Drill Press Setups Make Engine Maintenance a Production Operation

Special adaptations made to Delta drill presses permit United Air Lines to duplicate the precision and efficiency of the original plane maker in the "remanufacturing" of aircraft engines with a fraction of the capital outlay. Drill presses in ingenious setups are the principal tools in a production line operation for engine overhaul at the air line's San Francisco Engineering and Maintenance Base.

United rebuilds about 1,500 engines a year. Each power plant in its fleet of 195 aircraft comes in for



Using a 17-inch Rockwell-Delta drill press to swage the ends of oil cooler tubes used in rebuilding aircraft engines has cut assembly time in half at United Air Lines' San Francisco Engineering and Maintenance Base.

complete overhaul after an average period of approximately 1,500 hours in the air. Some 3,800 employees are engaged in all phases of overhaul work at the San Francisco base. Operations are departmentalized and each department is laid out for assembly line work.

Except for the absence of work on raw castings and steel, the engine overhaul line resembles that found in manufacturing plants. United uses drill presses especially adapted to particular jobs throughout the engine rebuilding line. For example, a Delta 17-inch drill press is used as a swaging tool in the retubing of engine oil coolers. There are 4,528 tubes in a DC-6 engine oil cooler and 6,419 in a DC-7 engine oil cooler. A number of these are replaced in each overhaul, the number depending upon condition of the cooler. To determine wear, the solution in which coolers are cleaned is screened and the residue is carefully analyzed and weighed. So important is this test that the residue is put in an envelope and permanently filed. The cooler is also inspected visually.

Generally, about 1,500 tubes are replaced in each overhaul, but all tubes may be replaced if wear has been substantial. Old tubes are removed with hand tools and new ones are inserted in their place. To permit swaging tube ends into the end plates with the Delta drill press at any spot of the face of the oil cooler, which is about 18 by 28 inches, a 9-inch extension has been added between the drill head and the motor. Belt and guard have been lengthened. The extension is a simple block casting drilled to fit

More Production . . .

the column and for locking screws. With the extension, the distance between spindle and column is 17½ inches instead of 8½ inches.

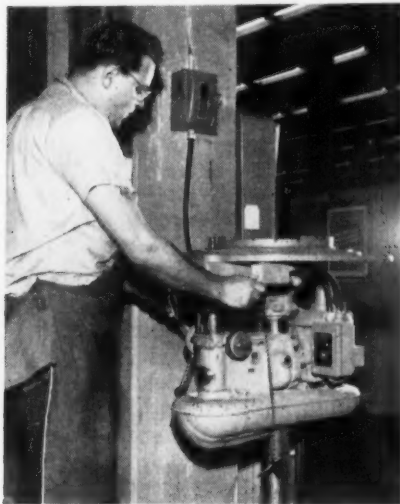
The swaging tool in the drill press chuck tapers from 0.20725 to 0.20750 inch. As each tube is swaged in place, its 0.006-inch wall is thinned by 0.0007 to 0.0010 inch. A lubricant is used in this work.

After swaging is completed, tube ends are ground down and the cooler is pressure tested. About 250 tubes are swaged per hour in the drill press setup. This is twice as fast as with the portable pneumatic swaging tool previously used.

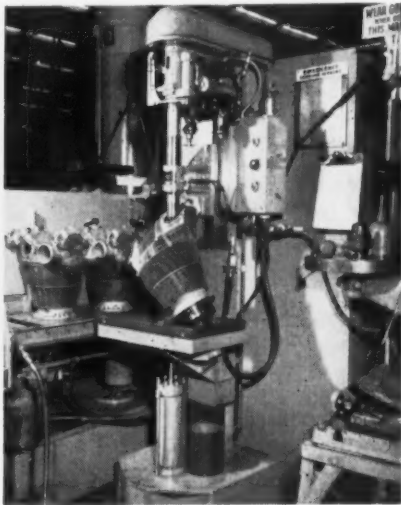
Special drill press setups are also used extensively in refinishing sur-

faces to original tolerances. In the setup for spot-facing bolt holes in a circular main engine support plate, a drill press is mounted upside down with the plate on a rotary table above. The shank of the spot facing tool is inserted through each bolt hole and the spot facer is screwed on the shank to reface the bearing surface. Tension in the spindle return spring, operating downward during the refacing, facilitates operator's control during cutting.

Because of the ease with which large or awkward pieces are positioned on a table free of the tool's own mounting, United has several setups in which drill presses are inverted and mounted below the table with the spindle protruding



By mounting a 17-inch Rockwell-Delta drill press upside down on its column, United Air Lines' San Francisco Engineering and Maintenance Base has greatly simplified maintenance work on a large engine mounting plate.



By using a specially designed tool setup for reaming valve holes during the overhaul of aircraft engine cylinders, United Air Lines gets the precision originally provided by the engine manufacturer with low cost tool.

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through the center hole. In one such setup, seat bosses in engine cylinders are reamed. The workholding fixture is simply made of a step block attached to the drill press column and a collar around the protruding spindle. The cylinder is set on the fixture and the operator feeds the spindle with a large handwheel substituted for the standard feed arm.

Before setting the cylinder on the fixture, the operator mikes the boss and selects a reamer that will remove 0.010 inch or less of metal. One or two cuts are made to ream the boss to the required dimensions.

The operator starts spindle feed with a large handwheel substituted for the standard feed arm. A pneumatic cylinder geared to the spindle pinion completes feed at a uniform rate.

United also used the drill presses in conjunction with hydraulic boring tools. These setups were designed by U.A.L. and built by Wadell Equipment Company, Clark, N. J. A hydraulically operated table, a hydraulic boring device, and a 17-inch Delta drill press are mounted on a square column.

A hydraulic cylinder raises the table to the correct height after the piece has been placed in position. The hydraulic boring device holds the cutting tool and provides uniform feed. The drill press is geared for 200 r.p.m. and rotates the spindle of the boring device.

The cut made in this operation is 0.015 inch through a 4-inch spindle travel. The spindle travels 2 inches per minute, while the tool

March, 1959

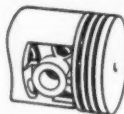


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traverses 51 surface feet. Tolerances are plus or minus 0.0005 inch from the center of the hole.

Approximately 100 cylinder valve holes are reamed daily in each of the two machines set up for this work. The work was previously done with a manually fed drill press. The new system was devised to assure greater accuracy.

Most of the special drill press setups at United are used only for the one job for which they were designed. This is economically feasible because of the large volume of work and because of the low cost of the tools. In some cases, however, a setup is designed for more than one job. Plates of the same size as

the work tables are drilled to receive any one of several fixtures and the tables are drilled and tapped to permit attaching the plates with four screws.

In one such setup, with a plate designed to hold work for three different operations, United has also substituted a special chuck adapter that will hold a tool with a number four Morse taper for the standard chuck. The three jobs done in this setup are spot-facing the piston pin boss in a cylinder, spot-facing a rocker arm bearing, and machining the rocker arm bearing. To change setups it is necessary only to swing the table to the proper position and adapt its height. The work was formerly done with three different fixtures.

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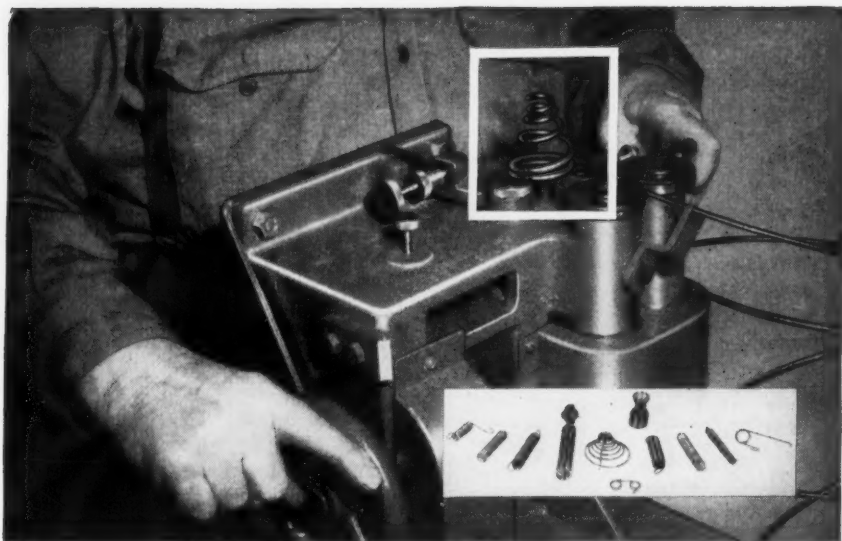
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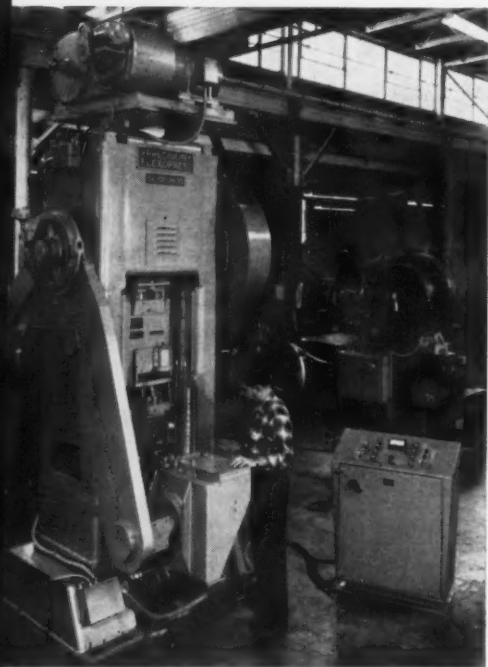
March, 1959

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More Production . . .

Press Assures Unusually High Speed Production of Rotor Laminations

A 100-ton press has been shipped from Precision Welder and Flexopress Corporation, Cincinnati, Ohio, to a motor producing plant where the press will be used in producing stator laminations, a job the press can do at rates exceed-



Precision's speedy 100-ton Flexopress, equipped with Flexofinger Feeder and die-set for blanking laminations for electric motors. Operator is looking at a stack of lamination blanks (cookies) in feeder magazine. Stack will supply only two minutes' work for press operated at speed of 250 strokes per minute.

ing 300 parts per minute—one for each press stroke. To get an idea of what this means, consider that the ram on this Precision Flexopress weighs close to half a ton. To make 300 strokes a minute it must travel 2 inches, come to a full stop, and reverse direction 600 times a minute. At such speed, the inertia of the ram creates an impact force of at least 100 tons. Even at this speed and stroke the Flexopress does not even have to be bolted to the floor. Much of the secret of its operating smoothness lies in the preloaded ball bearing raceways on the ram.

The V-type raceways require no clearance for lubrication. The ram is "locked" to operate only in the vertical plane, preventing sideplay. This no-float construction maintains alignment of punch and die.

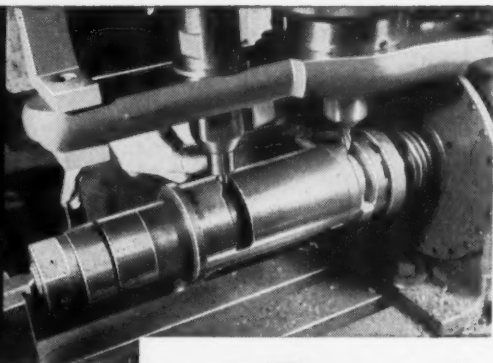
The precision brought about by this construction is said to invariably result in increased die life. The press is expected to double the life of the blanking dies used in it. This is a rather strong prediction, considering that the dies will be called on to blank slots and holes in 0.025 inch silicon steel circles — and silicon steel is a brittle, die-busting material. The doubled die life possible with Flexopress design is a result of ram accuracy, which preserves the clearances between punch and die through millions of strokes.

With the Flexopress, electric motor laminations are mass-produced by the punch and repunch method. Punch and repunch is a two-step operation. First blanks (cookies) are stamped out of sheet or strip. Then the cookies are stacked and fed individually into a die that punches slots and holes.

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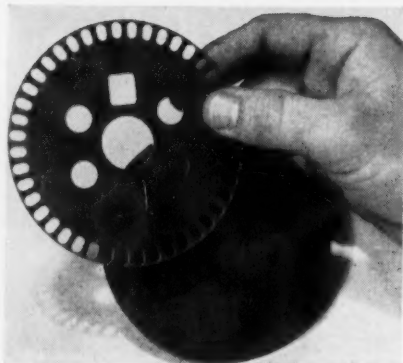
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designed for repunching these silicon steel cookies, has a number of unusual design features. For example, this Flexopress is designed with six preloaded ball bearing gibs. The 100 ton capacity Flexopress is normally built with four gibs for vertical operation. The addition of a central pair of gibs permits the press to be inclined if the user desires and still have the weight of the ram carried on four gibs.

The press has also been equipped with a Precision-designed feeder for maximum production with the press mounted in its normal vertical position. This gives the advantage of absolute control over feeding and ejection. Named the Fingerflex Feeder, the simple shuttle feed em-



Cookie and stamped lamination of 0.025 inch silicon steel. The extreme accuracy of the Flexopress, achieved by its preloaded ball bearing raceways, is expected to double die life on this particular stamping operation.

plays spring-loaded fingers (dogs) in reciprocating and stationary guides to slide the cookies off a stack and into the die. It is linked by a timing chain with the crankshaft of the press.

If two cookies stick together and are fed into the die, the Precision Flexo-stop automatically stops the press before any damage can occur. It operates by detecting indicated deflection of the press flywheel caused by as little as 0.010 inch additional stock thickness, and immediately disengages the air clutch. For more data circle 3 on Postpaid Card

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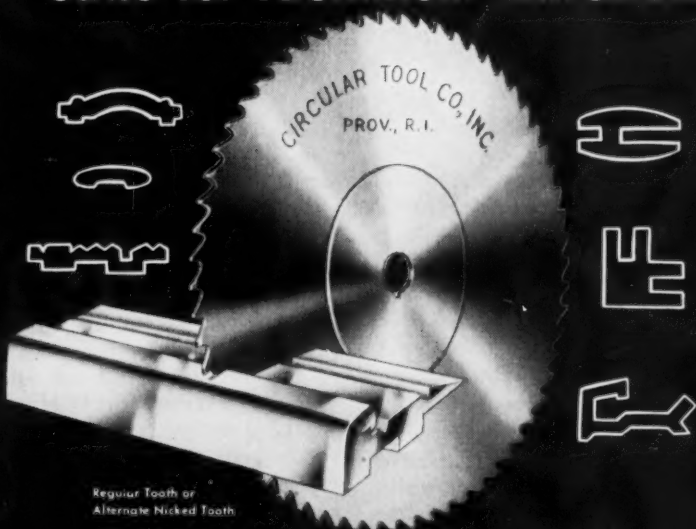
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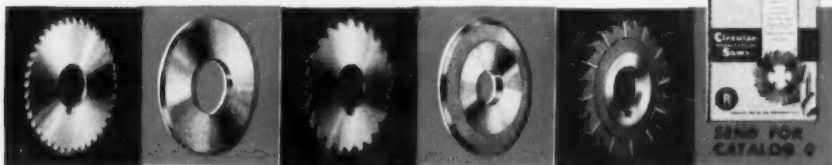
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For more data circle 412 on Postpaid Card

March, 1959

modern machine shop 161

ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

Adapter Permits Use of Portable Drill in Engine Lathe

By H. J. GERBER

Quite often we find it practical to make use of a portable electric drill mounted on the carriage of an engine lathe. To facilitate installation of the drill, we have made the simple adapter illustrated in Fig. 1 which fastens the drill to a standard boring tool holder on the lathe compound, as shown in Fig. 2.

The cylindrical adapter has been fitted with a threaded stud which

protrudes from one end. The stud screws into the handle mounting hole at the rear of the drill body housing and provides an efficient means for accurate alignment of the drill axis.

This drill adapter has a number of practical uses. At times we find it necessary to drill small holes on the center of rotation of work held in the chuck on the lathe spindle. Normal spindle speeds on large lathes are too slow for small drill sizes so we use the portable drill as a "drill speeder." Feeding is done by hand or power carriage feed.

Quite often it is desired to drill a series of holes in a circle concen-

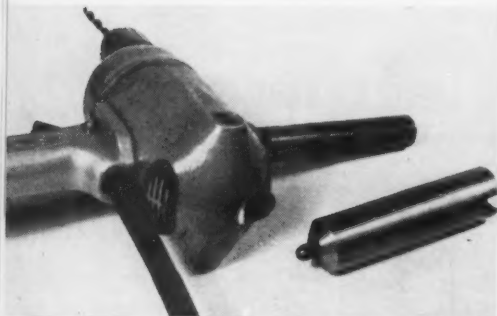


Fig. 1—Simple adapter allows for mounting portable electric drill in an engine lathe.

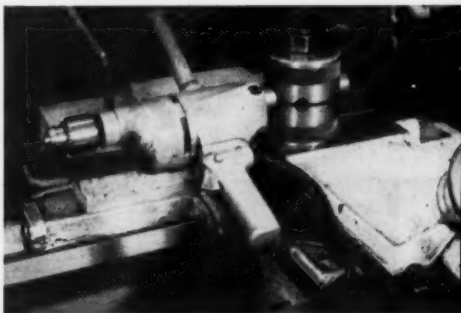


Fig. 2—Portable drill equipped with adapter is mounted in boring tool holder on lathe.

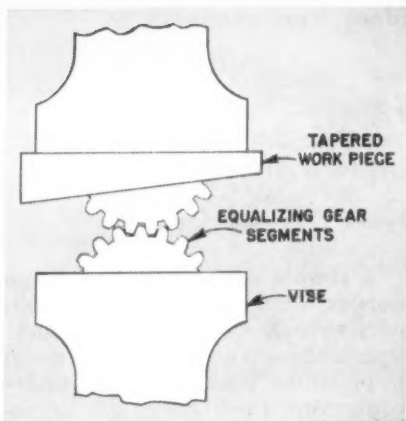
tric to the work center, such as in a pipe flange. In cases of this type, the cross slide is offset to the proper radius of the hole circle and the drill is advanced to each hole location as the work is hand rotated to proper position. This latter arrangement often saves making a separate setup on the drill press.

★ modern machine shop ★

Clamping Tapered Work in a Vise

By F. MURRAY

The accompanying sketch shows a simple setup for clamping tapered workpieces firmly in a vise. Two segments, cut from a discarded gear are inserted in the vise



Sketch showing simple setup for firmly clamping tapered workpieces in a vise.

in the manner shown so that the tapered workpiece can be firmly gripped as indicated in the sketch.

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the 3-D Magnifier that speeds production and leaves both hands free to work

ideas from readers . . .

Tapered Nylon Guides on Grinder Halt Chatter of Thin Sheet

By IRA S. ROBERTS

A simple set of tapered nylon guides, easily applied in the ordinary shop, has eliminated the buckling tendency of light-gauge metal in pinch-roll grinding and polishing equipment. Commonly, this vibrating trouble occurs as the work both approaches and leaves the abrasive belt. Often it results in chatter marks on the work.

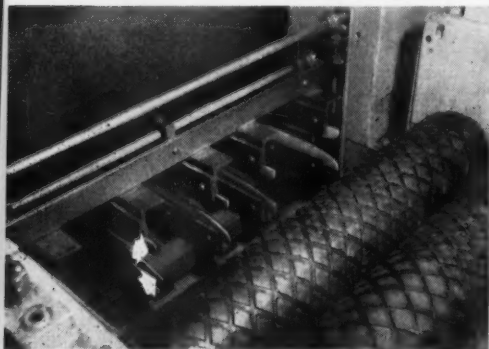
Product engineers at Behr-Manning Company, modified the feed system on standard pinch-roll machines by adding a simple framing of angle iron to hold tapered guides of molded nylon $\frac{1}{8}$ inch thick and about 10 inches long. The nylon is clamped in place between cold-rolled strips and thus can be installed

and replaced quickly. As shown in the accompanying illustration, the nylon strips are mounted both above and below the work, and completely eliminate the troublesome flapping. The clamping method permits the guides to be spaced accurately to accept sheets of different thicknesses.

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Manufacturing Processes—Production. Second Edition. By S. E. Rusinoff. Published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. 560 pages. Illustrated. Cloth binding, board covers. Price, \$7.25.

Designed to fill the need for a comprehensive study of the machinery employed in the fabrication of metal, this book covers the selection and use of machine tools and related equipment, recent developments in production methods, and the latest techniques in safety engineering. This revised, enlarged edition includes chapters on the adaptation of automatic methods to metal cutting and to forging and forming operations. It is profusely illustrated with approximately 400 helpful photographs and drawings.



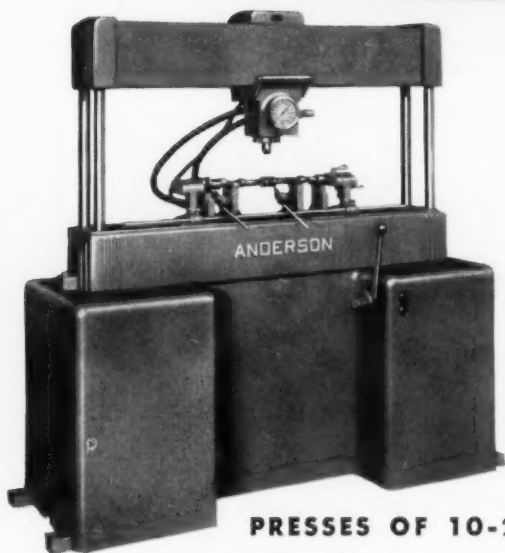
Arrows indicate placement of nylon guides on a 50-inch grinder. The guides are used at both the in-feed and out-feed positions.

More Information?

For additional information on any product mentioned in this issue, please use the READER SERVICE CARDS opposite pages 32 and 292.

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ROCKFORD, ILLINOIS**

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March, 1959

modern machine shop 165

new shop equipment

*Descriptions of new machines, tools
and materials for metalworking.*

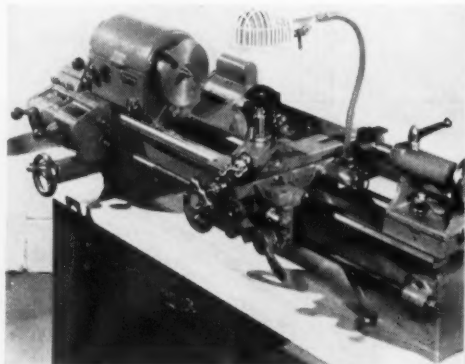
10 INCH LATHE

A 10 inch metal cutting lathe, featuring a variable speed drive and $\frac{3}{4}$ inch collet capacity, is introduced by Rockwell Mfg. Co., Delta Power Tool Div., 606B North Lexington Ave., Pittsburgh 8, Pa. Designed to fill the need for a low cost lathe to do heavy duty work in commercial metalworking shops, plant maintenance shops, toolrooms and other industrial operations, the lathe is compact, modern looking and easy to operate.

The variable speed drive gives the operator all the advantages of infinitely variable speed from 50 to 1,500 r.p.m., plus the high torque transmitting power of matched vee belts in the final drive to the spindle.

The $\frac{3}{4}$ inch collet capacity is obtained by using a 4-C style collet with a 15/16 inch hole through the spindle.

Features include: a massive, double row, preloaded, inboard spindle ball bearing which is sealed against dirt and lubricated for life; the vee-pulley for the two tandem, matched vee-belts is located between the spindle bearings; a quick change gear box provides a choice of 54 feeds or thread pitches; clutch operation allows an infinite choice of power transmission from a maximum setting for heavy cuts to a light engagement to avoid overloading the motor; the variable speed drive



Delta 10 Inch Metal Cutting Lathe

can be preset on the job to whatever high or low speed limit is desired in either direct or gear drive.

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CORRUGATED BOX PRINTER

The Pannier Corp., 409 Sandusky St., Pittsburgh 12, Pa., announces an automatic knock-down corrugated box printer, which was designed to print and/or imprint corrugated boxes economically and easily. It does this job two ways, each of which will save the manufacturer storage space and inventories of boxes. First, this unit will

and shop materials

new
shop
materials

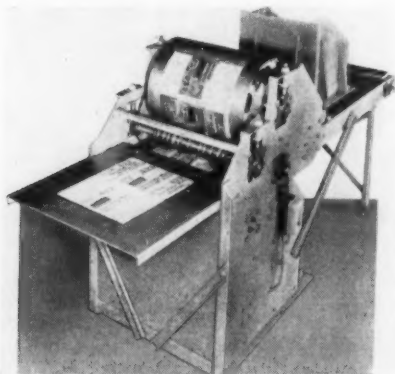
Edited by L. L. BALDHOFF

print the entire carton or will imprint code, product identification, sizes and so on, on preprinted boxes in quantities to accommodate a full day's requirements; second, the machine will print entire carton or will imprint code, product identification, sizes and so on, on preprinted boxes one at a time as needed for production line filling.

This printer will handle cartons up to 21 inches wide by 32 inches long and will deliver up to 2,400 smudge-free impressions per hour.

This single unit measures only 3 feet wide, 10 feet long and 57 inches high. It is powered by a $\frac{3}{4}$ h.p. gear motor.

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Automatic Knock-Down Corrugated Box Printer

March, 1959

ELECTROLYTIC PRODUCTION GRINDER

Development of a vertical spindle electrolytic grinder, capable of extremely high production with minimum wheel wear in the grinding of brazed-type carbide tools, is announced by Mattison Machine Works, Rockford, Ill. The machine uses a 1,500 ampere "Anocut" unit to supply the current required for the electrolytic grinding process.

Surface finishes up to 6 microinches are obtained, while taking off up to 0.012 inch of tungsten carbide in a single pass. There is no actual contact between the wheel and workpiece, thereby reducing wheel wear.

To permit maximum efficiency in loading and unloading the work, the rotary table has wedge shaped magnetic sections that are energized individually just before the workpieces go under the diamond wheel and de-energized immediately after pieces on the particular section leave the wheel.

The worktable has a speed range of 1.7 to 12 r.p.h. and the spindle motor is 25 h.p., 1,800 r.p.m. Special provisions are made to keep the electrolyte away from the brushes that carry electric current to the grinding wheel and to remove excess electrolyte vapors from the immediate area of the grinding wheel. A small blower moves air outward from the brush area and

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new shop equipment . . .



Vertical Spindle Electrolytic Grinder

mist collector gathers the vapors for condensing and draining back into the electrolyte storage. Capacity of the coolant system is 100 gallons. The coolant pump is $\frac{1}{4}$ h.p., 1,800 r.p.m. and can deliver 20 g.p.m. Protection for the grinding wheel is provided by a limit switch that stops rotation of the worktable if oversized stock is to be fed under the grinding wheel. Automatic stopping of the worktable is provided in the event electrolyte unit is cut out because of an overload. Diamond wheel used by the machine is 16 inches in diameter, with a 4 inch face and a $\frac{1}{16}$ inch depth of diamond.

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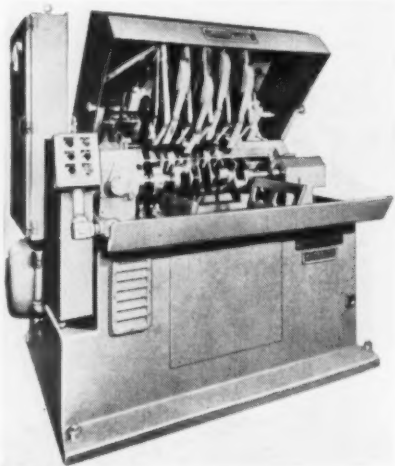
**MACHINE FOR LAPPING
OR ROLL BURNISHING**

The Foote-Burt Co., Cleveland 8, Ohio, announces the Footburt-Schraner

Model SF which is a manually loaded machine for lapping or roll burnishing bearing surfaces on straight shafts, crankshafts, camshafts, or for fillet rolling stress-concentration points in shafts. The Model SF will handle any shaft up to 36 inches long, and up to a 5 inch stroke. Any shaft with bearing surfaces $\frac{1}{2}$ inch wide or more and with at least $\frac{1}{4}$ inches between centers of bearing surfaces can be accommodated.

The Model SF uses coated abrasive cloth. In production, it will provide a 5 to 7 micro-inch finish when following a finish grind or precision turning operation that has left a 40 micro-inch or finer finish. The machine can lap bearing surfaces and fillets in one operation.

Roll burnishing is made possible by extra heavy heads and employment of anti-friction bearings throughout the heads. To achieve the same finish, lapping which eliminates abrasive costs, could be used in place of the slower method of roll burnishing. However, the primary reason to roll burnish rather than lap is to create a compressively stressed bearing surface



Footburt-Schraner Model SF Lapping Machine

new shop equipment . . .

for longer life. Fillet rolling is used to increase fatigue resistance of the work-piece by creation of a compressive stress at the surface of a fillet between different diameters on a shaft.

The Footburt-Schraner Model SF lapping, roll burnishing and fillet rolling machine can be provided with 1 to 16 heads. The hydraulic system can be either integral or separate. The 10 h.p. drive motor is fitted with an electric clutch and brake. Floor space required is 66 by 84 inches; height is 62 inches; net weight is approximately 6,500 pounds.

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HEAT TREATING FURNACES

Cooley Electric Mfg. Corp., Dept. F2, 38 South Shelby St., Indianapolis 7, Ind., announces two electric heat treating furnaces, designed for quantity production and with a temperature range of from 300 to 2,000 degrees F. Chamber dimensions are 10 by 7 by

18 and 8 by 6 by 14 inches. The furnaces feature multi-slab type of insulation, with heavy sheet steel body and cast iron end frames. Cooley type embedded heating elements give maximum heating efficiency and protection against chemical attacks and other physical damages. Other features include an industrial type hearth plate of cast nickel chromium and a vertically operated counterweighted plug type door, which closes securely with brick to brick contact and may be opened to any position.

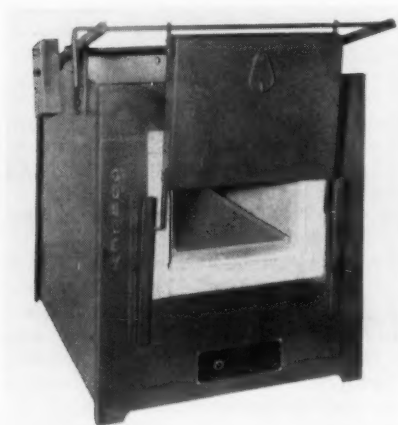
Advantages claimed include economical first cost, low power cost, low maintenance cost, simple installation, low exterior temperatures and ease of reconditioning. The elements may be changed in minutes without disassembling the furnace.

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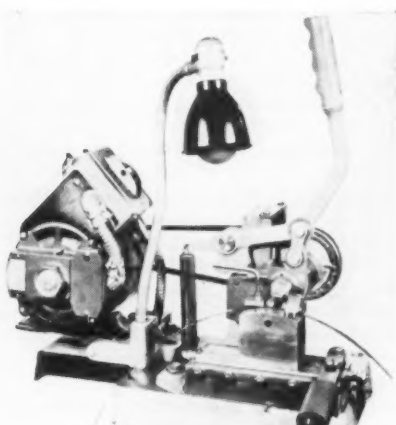
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HIGH SPEED BURRING MACHINE

H. B. Rouse & Co., 2214 North Wayne Ave., Chicago 14, Ill., states that production costs may be lowered, valuable time saved and greater accu-



Cooley Electric Heat Treating Furnace



H. B. Rouse High Speed Burring Machine

new shop equipment . . .

racy achieved by a high speed burring machine which is an adaptation of the Rouse Hand Miller. One application is rapidly reducing any small weld flash to the exact dimension of the metal joined. Other applications include smoothing burrs from previous finishing operations or cleaning out comparatively inaccessible places, such as casting slots. Completely eliminated is tedious, inexact, time-wasting hand finishing. Operator output can be increased without the physical strain so common in such hand finishing processes. The machine is quickly set to the exact specification desired for each production run. Each piece is then rapidly, uniformly burred with complete accuracy. There are no variations to cause rejects.

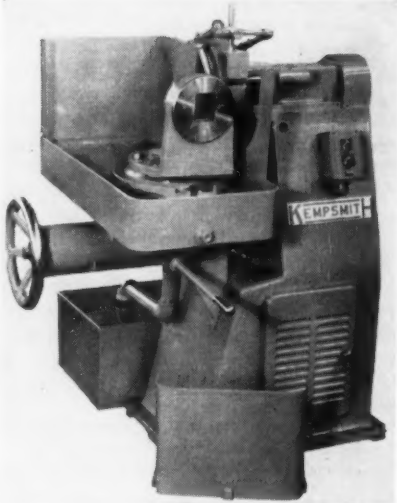
The Rouse Hand Miller is a high speed, ball bearing motor driven machine for quickly and accurately handling light cuts in brass, aluminum, steel, plastics and other materials. Conversion into an accurate, high speed burring machine is simple. It is only necessary to step up spindle speed to 10,000 r.p.m., attach a high speed carbide burr to the output shaft and adapt a fixture to accommodate the piece.

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TOOL GRINDER

The Kempsmith Machine Co., Milwaukee 14, Wis., announces a heavy duty production tool grinder. The spindle of this grinder is mounted on three large precision anti-friction bearings in front and a double anti-friction precision bearing in the rear. It is driven by a 3 h.p. motor located in the base of the machine via a V-belt drive. The wheel mount end of the spindle is massively designed to fur-



Kempsmith Production Tool Grinder

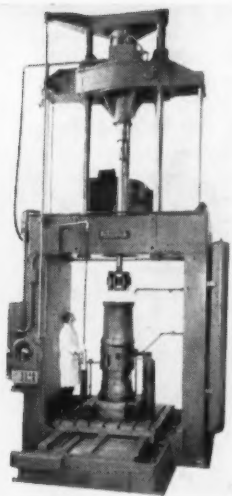
nish rigid support to the grinding wheel. Metal backed cup wheels are used. Tool bits to be ground are held in a double swivel right angle holder, which permits grinding at all angles. This tool bit holder is mounted on a cradle which pivots on a large steel guide. The cradle is rocked to and fro, past the face of the grinding wheel and, by turning the handwheel, is fed toward the wheel. A complete coolant system is provided, as are adequate guards. The electric is to N.M.T.B.A. standards with J.I.C. electricians available.

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HONING MACHINE

Barnes Drill Co., 860 Chestnut St., Rockford, Ill., announces an extra heavy duty machine for honing large bearings, cylinders, cylinder liners, marine and diesel parts and compressor cylinders. The machine pro-



Barnesdril Vertical Honing Machine

vides a capacity range up to 36 inches in diameter and 72 inches in length. It is equipped with a 30 h.p. motor on the head, and 20 h.p. motor on the hydraulic unit.

Equipped with pneumatic hone expansion and a spindle stroke of 80 inches, the machine is used for honing 14 to 19.5 inch diameter cast-iron cylinder liners, 70 inches long. Stock 0.010-0.020 inch is removed and finish of 7 to 32 r.m.s. produced.

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CUTTING FLUID

Fiske Brothers Refining Co., 129B Lockwood St., Newark 5, N. J., reports that Fibrecool, its new water-soluble cutting fluid enables heavier cuts, higher speed machine operation and results in longer tool life. Fibrecool is quick emulsifying and does not foam nor become rancid. As it is transparent, it permits visibility of cutting operations. According to the

company, Fibrecool produces superior finishes at a lower cost in both cutting and grinding operations.

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LAYOUT FLUID

The Dayton Rogers Mfg. Co., Minneapolis 7D, Minn., announces an improved layout fluid compound, now offered in seven contrasting colors.

This material has an adhesive agent, which will definitely adhere to practically any metal surface for all machining and layout operations, as well as other details.

A free sample, with a combination brush-in-cap container, may be obtained when requested on company letterhead.

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WELDING ELECTRODE

The Lincoln Electric Co., Cleveland 17, Ohio, announces Fleetweld 180, a new E-6011 electrode for arc welding sheet metal and for general maintenance welding with small transformer welders.

The manufacturer states that the electrode's ability to operate at currents as low as 50 amperes and its light slag make it possible to weld even 0.036 inch (20 gauge) material without burn-through. On the other hand, when the current is increased, the arc becomes forceful and deep penetrating so that it is suitable for general repair welding. The electrode is stable on machines with open circuit voltages as low as 45 volts. It has a steady arc with industrial a.c. welders, as well as farm or home welders.

Fleetweld 180 is available in 3/32, 1/8 and 5/32 inch sizes.

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new shop equipment . . .

COMPARATOR ADAPTS TO ANY DIAL INDICATOR

A comparator, adaptable to all types of A.G.D. dial indicators, is announced by Petz-Emery, Inc., Pleasant Valley, N. Y. This Model A Comparator can be supplied with any

of the 67 Em-re Dial Indicator models. Supplied alone, it can be equipped with an adapter to easily accommodate any dial indicator with conventional back. As a result, this comparator can be used for an extremely wide variety of precision measuring jobs with any A.G.D. dial indicator available.

An aluminum base makes it light in weight and easy to handle. Coarse

adjustment is made by sliding the indicator mount up and down the column and clamping in position. Fine adjustment is then made by rotating the left hand knob in either direction and locking in position with the right hand knob. For convenience and to prevent excess wear in one spot, the stage is adjustable and reversible from front to back and, by rotating 90 degrees, from side to side. It has

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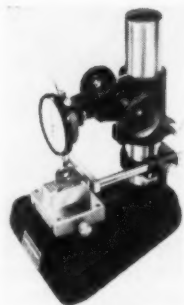


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Detroit 5, Michigan, Engineering Dept. M.

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**Petz-Emery
Comparator**

Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES



NEW

New. Revolutionary double-box Headstock (Pat. Pend.)

New. "WORK-HOLDING ONLY" Spindle.

New. Single-Shift Back Gear Lever on Headstock.

New. Headstock and Apron running in oil.

New. 1 1/2" Hole through Spindle.

New. 60-pitch Gear Box with built-in Lead Screw Reverse.

New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.

Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.

Different. Two independent clutches in apron for selecting power feeds.

Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.

Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

\$2468⁰⁰ base price
F.O.B. Factory
(Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

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☐ The NEW and DIFFERENT SHELDON 15" Lathes

☐ Sheldon ☐ 10" ☐ 11" ☐ 13" Lathes

☐ 11" and 13" Variable Speed Lathes

☐ High Speed Turret Lathes

☐ Sebastian 13" and 15" Geared Head Lathes

☐ Horizontal Milling Machine

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Company Name _____

Street Address _____

☐ Company

☐ Home

City _____

State _____

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new shop equipment . . .

a $\frac{3}{8}$ inch hole for mounting post-type anvils. The anvil can be rotated 90 degrees and has a lapped surface.

The comparator is equipped with a $1\frac{3}{4}$ inch diameter ground stainless steel column with $3\frac{3}{8}$ inch clearance between column and contact point. Vertical capacity above anvil is $3\frac{3}{8}$

inches. Other models are available with both $5\frac{1}{8}$ and $7\frac{1}{8}$ inch vertical capacities.

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UNIVERSAL CHUCK

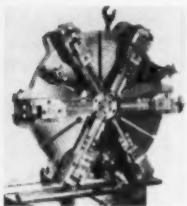
Garrison Machine Works, Inc., 515-525 Bannock St., Dayton 4, Ohio, announces a 30 inch diameter universal

chuck that enables the user to control chucking pressure exerted on the workpiece. It also features jaws which open wide for easy loading and unloading, rapid setup and change-over and extreme accuracy.

These chucks, which are custom-built, will accommodate gears, rounds and odd shaped workpieces. False jaws may be made by the user to handle additional parts, as necessary. The rapid acting jaws, which open wide for easy chucking of the part,

Now!
Work hard
metals with-
out heat
or
distortion

Reduce
wheel
cost up
to 90%



Garrison 30 Inch Universal Type Chuck



Electrolytic Metal Removal

Potential Unlimited

This new procedure has solved hitherto unsolvable problems, and greatly increased capacity and quality in virtually every application.

As pioneers in this very "young" development, we can offer you real help in licking hard metal removal problems, with actual installation and performance data. **WRITE TODAY!**



Missiles



Tool & Die Ind.



Automobiles



Aircraft

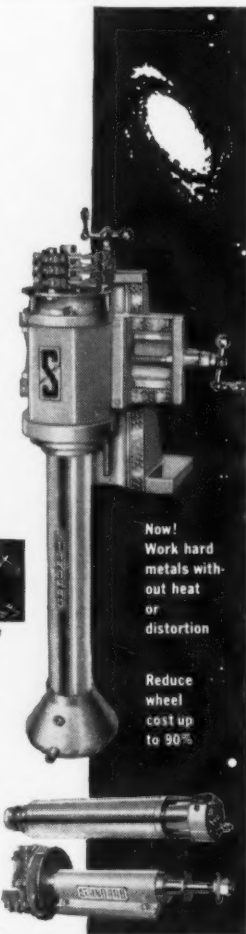
Results depend on the spindle used. There is nothing finer in its field than a STANDARD Super Precision Spindle . . . available for electrolytic application in 50 to 3000 Amperes.

THE STANDARD

ELECTRICAL TOOL CO.

Precision Spindle Division
2487 River Road, Cincinnati 4, Ohio

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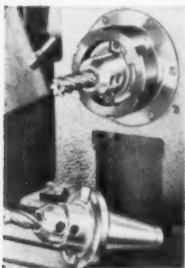
pull the workpiece back into the chuck and against positive rest stops. Since chucking pressure can be controlled, parts may be chucked with a feather light touch, without distortion. The same chuck may also be used to round-up parts, which have become distorted in heat treat, simply by increasing the chucking pressure.

Simplified design and complete factory calibration of the chucks reduce setup and changeover time when used in conjunction with the tooling charts supplied with each chuck. Available in a complete range of sizes, these chucks may be used on almost any machine having a hole through the work spindle. For more data circle 72 on Postpaid Card

★ m m s ★

END MILL HOLDER

End mill holders for use in all horizontal and vertical milling machines with No. 50 National Standard Taper



End Mill Holder

March, 1959

Spindles having the Cincinnati Arbor-Loc feature are announced by The Weldon Tool Co., 3000 Woodhill Rd., Cleveland 4, Ohio.

They serve double or single end mills with shanks from $\frac{3}{8}$ to $1\frac{1}{4}$ inch, inclusive. Changing the holder is a simple operation, yet it holds the end mill securely. They are said to be a notable timesaver that will speed production in any machine shop.

For more data circle 73 on Postpaid Card

ONE

just

heavy duty unit services up to 19 MACHINES

DUSTKOP
STOPS DUST

In the complete line of Agat Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.

46 Standard Models—Ready to Use

AGET manufacturing company
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modern machine shop 175

new shop equipment . . .

DIAL INDICATOR ALL ANGLE POSITIONER

Spin-Back is a dial indicator all angle positioner, available from Hubbard-Spring Machine Co., 117 East Third St., Uhrichsville, Ohio.

This instrument all angle positioner is a self-contained assembled unit. It

is an indicator back, made to replace the lug mount or special back of a dial indicator. It operates smooth with a feather touch, and is extremely rigid for precision work using tenth indicators, or will hold against vibration of a machine. It is smooth in design, very compact, light in weight and non-magnetic.

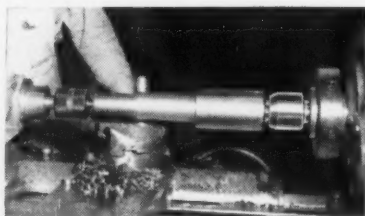
Spin-Back has the following uses: production machines, tool and die room, maintenance and so on. It can

be used on lathes, milling machines, grinding machines, horizontal boring mills, planers, automatics, punch presses and all metalworking machines, both light and heavy, wherever a dial indicator can be used for visual control of a machine for greater and faster precision.

The instrument mount is made to fit most popular makes of dial indicators of the 2 to 2 1/4 inch dial size.

For more data circle 74 on Postpaid Card

New "Driving Center" Introduces Faster Machining Techniques on Work Held Between Centers



Eliminates Chucks and Clamps... Permits Full End-to-End Machining... "Loads" or "Unloads" without Stopping

Designed to increase both output and accuracy, the new Ideal Driving Center grips end face of work and eliminates need for chucks, dogs or other clamping devices . . . Work may be machined end-to-end without removal—usually can be loaded and unloaded without stopping . . . Rigid direct-drive action reduces backlash—prevents slippage—simplifies indexing on gear hobbars and mills . . . No preliminary machining needed; self-compensating pins grip and hold non-uniform work ends—even odd shaped pieces . . . 63 combinations fit maximum work diameters from 7/8" to 6 3/8", in Morse tapers 2 to 6. Larger sizes may be had as specials.

MAIL COUPON FOR COMPLETE DETAILS



1031-C Park Ave.
Sycamore, Illinois

Please send me complete engineering data and selection chart for IDEAL Driving Centers.

Name

Company

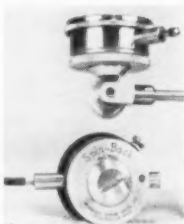
Address

City

Zone

State

For more data circle 419 on Postpaid Card



**This "Spin-Back" is
a dial indicator all
angle Positioner**

DRILLING AND TAPPING LUBRICANT

An improved clinging type lubricant, applicable to all surfaces at all angles—for drilling, tapping, reaming and drawing of all metals from aluminum to the hardest of drillable steels—is produced by Protective Coatings, Inc., Box 3985, Detroit 27, Michigan.

It is claimed that this lubricant leaves a rust inhibitor on the metal when flushed off, yet the inhibitor easily may be removed by a solvent or detergent.

Micronoil Drill and Tap Lube is packaged in 12 ounce plastic bottles and in 1 and 5 gallon pails. For more data circle 75 on Postpaid Card



Micronoil Drilling and
Tapping Lubricant

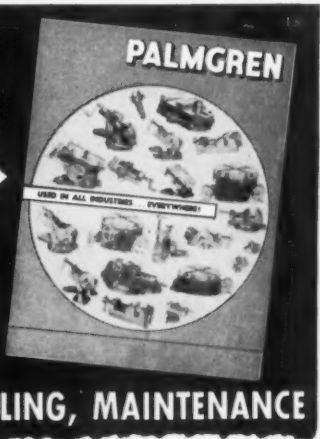
TOOL AND DIE STEEL

A cold work alloy tool and die steel, Lo-Air, is announced by Universal-Cyclops Steel Corp., Bridgeville, Pa. Lo-Air is designed to provide a tool steel that features: high hardenability, heat treating from low temperatures, least distortion and easy machinability. Lo-Air Tool and Die Steel is designed for blanking, forming, coining and trimming dies, as well as for shear blades, spindles, mandrels,

WRITE NOW FOR
THIS

FREE
CATALOG

ON
WORK HOLDING
TOOLS FOR
PRODUCTION, TOOLING, MAINTENANCE



Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

PALMGREN PRODUCTS

by CHICAGO TOOL AND ENGINEERING CO.
8399 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

For more data circle 420 on Postpaid Card

new shop equipment . . .

stripper plates and many other applications.

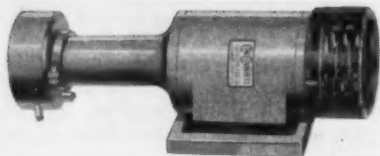
Lo-Air tool and die steel is said to have excellent machinability characteristics, which have been proven through extensive research in drilling, tapping and turning tests.

For more data circle 76 on Postpaid Card

★ modern machine shop ★

**ELECTROLYTIC
CONVERSION SPINDLES**

Replacing or converting existing spindles for electrolytic grinding on surface, tool and cutter, carbide tool and other grinders or applying these spindles to existing planers or milling machines, is now possible, according

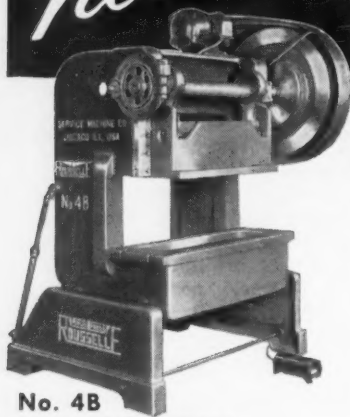


Electrolytic Metal Removal Spindle

to The Cincinnati Electrical Tool Co., 367 Mt. Hope Ave., Cincinnati 4, Ohio.

Electrolytic metal removal, heretofore confined to the aircraft and carbide tool industry, has been expanded to many other grinding applications, particularly where a hard metal is involved and a close tolerance, burr free finish is required. Spindles are offered for operation up to 3,000 amps and in various styles and sizes. For more data circle 77 on Postpaid Card

New **40-TON DOUBLE CRANK O. B. I.
ROUSSELLE**



**No. 48
ROUSSELLE PRESS**

**WITH NEW ELECTRICALLY
CONTROLLED AIR CLUTCH**

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



SERVICE MACHINE CO.

Mfrs. of Roussele Presses

2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

For more data circle 421 on Postpaid Card

For the Precision
of a Count-down



T-J

LAUNCHES A NEW
CUTTING TOOL LINE
FOR MILLING ACCURACY

For precision milling to close tolerances, so vital in today's high-speed, high-production manufacturing, T-J now offers a new, improved line of milling cutters. The new cutter line features a high helix angle, double back-off, and a right-hand spiral to produce more and smoother cuts between grinds, and a free-cutting, stronger tool.

Specially designed and precision-manufactured for die sinking and production milling, the new line is designed to include flats on the shanks for set screw type drivers on all of the end and side milling cutters. Write today for complete information to the Tomkins-Johnson Company, Jackson, Mich.

Ask for completely new
cutter catalogue No. 259.

T-J

TOMKINS-JOHNSON

RIVETORS... AIR AND HYDRAULIC CYLINDERS... CUTTERS... CLINCHERS

For more data circle 422 on Postpaid Card

March, 1959

modern machine shop 179

new shop equipment . . .

CARBIDE TOOLHOLDER

Maxwell Industries, Inc., 493 East Fifth Ave., Ashtabula, Ohio, announces the universal-positioning "Throwaway" carbide toolholder. This unit combines the proven economy of carbide throwaway inserts with the added savings of universal positioning

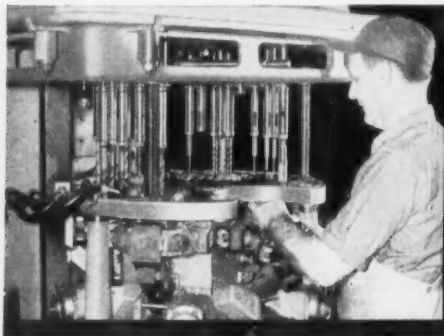
for all metal turning and shaping operations.

This one holder does away with the need for having several fixed angle holders in different sizes. In addition to reducing investment in tooling, it speeds up the machine operator's work since it eliminates the need to change holders from right to left hand or straight during a sequence of operations. Furthermore, when indexing the insert, it is not necessary to

disturb the setup by taking this holder out of the machine. Only the cap assembly is loosened, the carbide indexed and cap retightened. The toolholder remains on center of the workpiece, further speeding up the operations.

Ruggedly built with forged steel shank, anvil and clamping cap assembly with cap screw having nylon insert for rigid locking, this toolholder makes it possible to position the carbide to any desired angle—right, straight or left—or use for facing in either direc-

HOW SEIBERT SPINDLES HELP SUNDSTRAND BUILD BETTER PUMPS



★ For 4 years, Seibert Multiple Drill Spindles have been helping maintain close tolerance standards at the Hydraulic Division of the Sundstrand Machine Tool Co., Rockford, Illinois. Multiple spindle drilling machines, as shown in the photo above, are equipped with 32 Seibert Slip Spindles and Adapters of varying sizes, for drilling, reaming, chamfering, and spot facing cast iron Fuel Unit Pump Bodies. Tolerances are held to within .002" of basic location, at spindle speeds ranging from 805 to 2760 R.P.M.

Investigate today, the three advantages of standardizing with Seibert production holding tools. You will find they will meet your most exacting tolerance requirements because they are precision built . . . you save money too, for Seibert holding tools are lot produced in a wide range of standard sizes . . . and your orders receive prompt, efficient handling because Seibert specializes in the manufacture of production holding tools only.



FREE DATA

Write for Folio 1-30 illustrating and describing the complete line of Seibert Multiple Drill Spindles.



Upper and Lower Drive Assemblies



Pinion Drive Shafts



Universal Joints



Bracket Spindle Assembly



Adaptor



SEIBERT & SONS, INC.

1001 E. 24th STREET
CHENOA, ILLINOIS

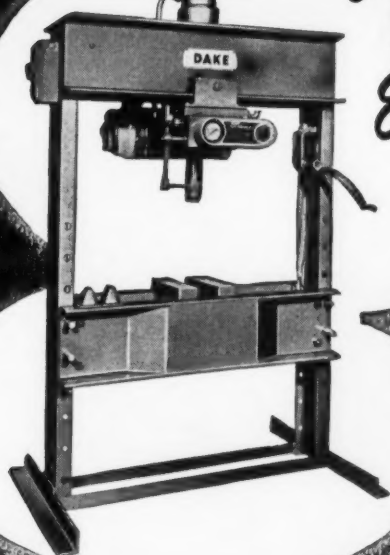
Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

For more data circle 423 on Postpaid Card



Maxwell Toolholder

New!



DAKE Elec-draulic PRESS

▶ OPERATES
EASIER, FASTER

▶ COSTS
LESS

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features :



Rapid Ram Approach

Automatically changes to power stroke when it contacts the work.



Variable Ram Speed

From zero to maximum under fingertip control.



Movable Workhead

Self-contained—easy to center over the work. Workhead can be purchased separately.



Modern Design

All operating controls at convenient working height.

**DAKE
PRESSES**

These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request.

Dake Corporation, 612 Robbins Road, Grand Haven, Mich.

For more data circle 424 on Postpaid Card

new shop equipment . . .

tion to or from center. Further economy results from the complete use of the precision ground positive rake carbide inserts, which can be indexed four times. The cap assembly also carries an adjustable carbide chip breaker which may be indexed four times and which is replaceable.



Die Springs

Chrome vanadium die springs in stock in a wide variety of hole and rod sizes, lengths and deflections. Medium, medium-heavy, heavy duty for increased life and reduced down time. Write for list of specifications and prices, and name of nearest distributor.

5837

For more data circle 425 on Postpaid Card

Other advantages are that any grade of carbide required for the job may be used without investing in additional holders. High speed square or round tool bits or boring bars can also be used on this universal-positioning holder with a simple addition of a standard clamping cap at nominal cost instead of complete holders for each individual grade and shape of cutter. Sizes to fit all standard tool

posts, square turrets or toolholders are available.

For more data circle 78 on Postpaid Card

★ m m s ★

BAND SAW BLADES

A high speed steel band saw blade is announced by American Saw and Mfg. Co., Springfield, Mass. Recommended specifically for special high speed steel band saw machines, Lenox Blades have achieved successful performance records on some regular band saw machines. These blades are

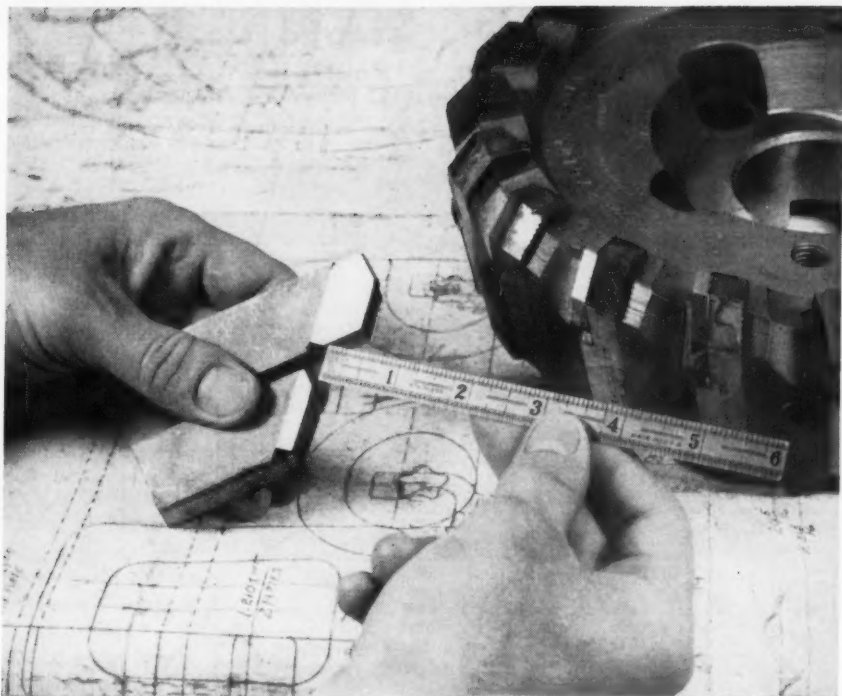


**Raymond
Manufacturing
Division**

Associated Spring
Corporation
Corry, Pennsylvania



**Lenox Band
Saw Blades**



Ingersoll Heavy-Duty Shear Clear Face Mill designed for cast iron or steel. Size of bevel is varied to suit depth of stock.

What does your scrap barrel show?

Do you get over $\frac{1}{2}$ " of blade wear? A look into your scrap barrel will show that many blades were wasted because of cracks, misuse, improper design or misapplication of the cutter and grade of carbide. You probably can't tell why these blades failed prematurely because so many variables are involved.

We are used to working with these variables and can help you reduce your tool costs. Part of our product is the continuous counsel of your Ingersoll representative and our cutter engineers. They will consider the machine, material, speed, feed and finish requirements before recommending the tool which will do the best job at the lowest cost.

We will welcome an opportunity to tell you more about this service. Write:

For more data circle 426 on Postpaid Card

This helpful new booklet tells you how to reduce the cost of chips and improve your milling and boring performance. Ask for a free copy of booklet No. 684.



THE
INGERSOLL
MILLING MACHINE COMPANY
CUTTER DIVISION
505 FULTON AVENUE • ROCKFORD, ILLINOIS

new shop equipment . . .

claimed to cut faster, take greater feeds and last longer. Used in cutting the toughest steel alloys, they are effective in production work.

Available in standard and hook tooth design, Lenox high speed steel band saw blades can be obtained in several standard sizes.

For more data circle 79 on Postpaid Card

MICROMETER HEIGHT GAGE IS EASY TO READ

Foster Supplies Co., Dept. MMS, 6122 Milwaukee Ave., Chicago 46, Ill., reports savings in time and elimination of errors in reading are characteristics of the easy-to-read "Microball" Micrometer Height Gage.

The accuracy of Microball Height Gages has been subsequently increased by the use of a new dial indicator

comparator gage in conjunction with built-in micrometer. By manipulating the height gage micrometer thimble to offset deviations shown on dial indicator, 90 percent of the error inherent to dial indicators is said to be eliminated, giving more accurate readings on micrometer than were previously possible. It is obtainable in 12 and 24 inch heights.

For more data circle 80 on Postpaid Card

NEW FOSTORIA OPTA-VUE*

MAGNIFIES AND ILLUMINATES FOR QUICK, EASY PRECISION SEEING



Other models available for bench or machine mounting. Write for catalog.

MODEL D
\$40
COMPLETE

A sensational aid for increasing production speed and accuracy. Already in big demand throughout industry for easy viewing of tiniest work details. Many profitable applications for your plant.

* Trade Mark

Available at Electrical Wholesalers and Scientific Supply Houses

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

For more data circle 427 on Postpaid Card

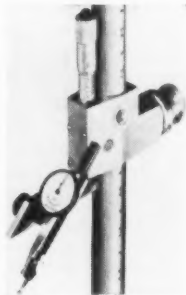
Provides Binocular vision for fine assembly, inspection, testing and all precision visual tasks.

6" x 6" optically ground Lucite lens. 36 sq. in. viewing area, free from distortion.

High light transmission with two 4W fluorescent tube Localite.

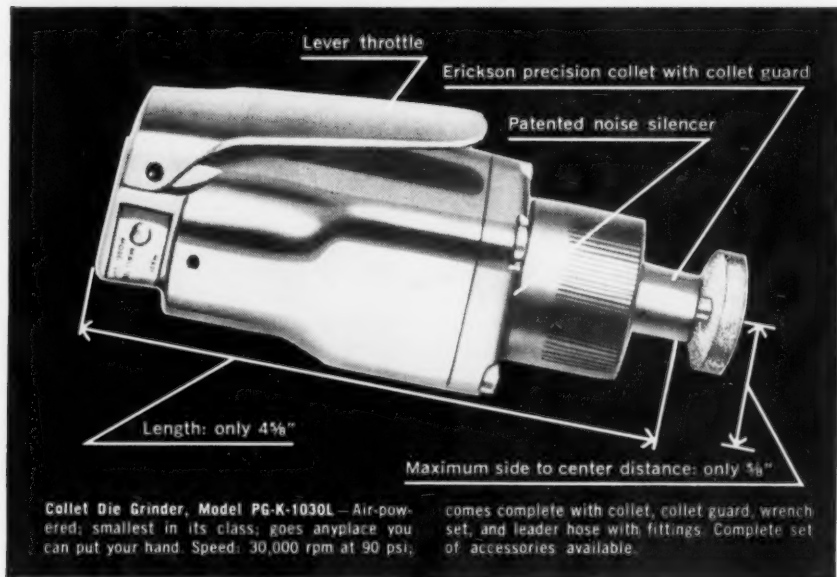
Lens and light independently adjustable. Frictional collar disc joints give flexibility for any position.

1/2" steel tubular stand finished in Hammerine Metallic Silver. Rubber feet. Size 12" x 10" x 9" high.

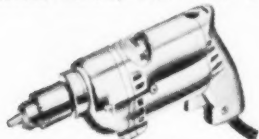


**Microball Height
Gage and Dial
Indicator**

POWER to boost job efficiency with REMINGTON tools



Flexible-Shaft Machine, Model 8FGP—3-hp, extra-heavy, continuous-duty electric motor, totally enclosed; dust- and vapor-proof; pedestal-mounted; 6-ft. flexible shaft.



3/4" Electric Drill, Model 381—Heavy-duty, 2.5-amp., AC/DC motor; free speed: 800 rpm, geared for exceptional torque; compact design; wt.: 5 lbs. UL-approved.

Remington delivers mobility and all the power you need to help cut production costs. With Remington you can standardize on the industry's widest selection of power tools—air, electric or gasoline-driven—with parts and service from one source. For free booklet describing the complete line of Remington Contractor and Industrial Tools mail Readers' Service card or see your local Remington distributor.

Remington

Remington Arms Company, Inc., Bridgeport 2, Conn.
IN CANADA: Remington Arms of Canada Limited,
36 Queen Elizabeth Blvd., Toronto, Ont.



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March, 1959

modern machine shop 185

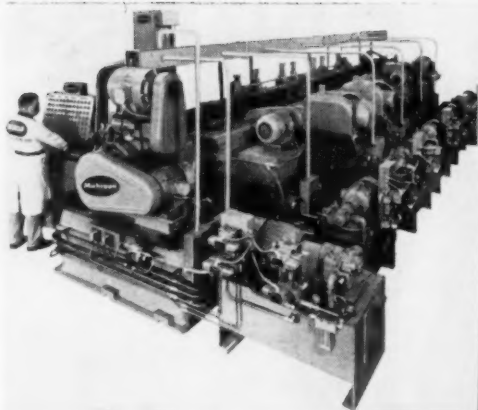
new shop equipment . . .

BEARING CAP PRODUCTION MACHINE

A fully automated, bearing cap machine is designed and built by Michigan Drill Head Co., P. O. Box 4643, Detroit 34, Mich. It is a 19 station transfer machine. It was designed to produce bearing caps for automobiles, where precision is a must. From a single one piece casting, it produces five finished bearing caps, and handles 75 castings (producing 225 bearing caps) per hour, at 100 percent efficiency.

This machine is sectionalized to effect further savings. Each working station is designed for individual cycling, making it easier for both set-up and checking at each station.

To further safeguard against obsolescence, a number of idle stations



Michigan Automated Bearing Cap Machine

have been provided, so that you can retool to handle changes, as well as other operations.

It is a compact machine and is ruggedly built—of welded steel con-

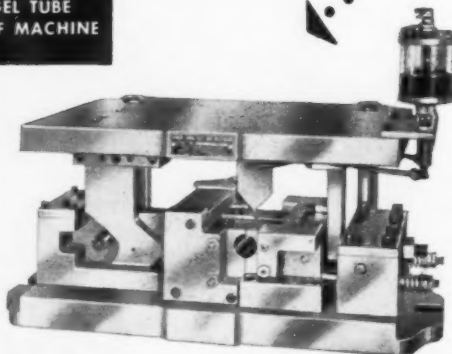
• Cuts Tubing to Accurate Lengths In —SPLIT-SECOND TIME!

LENGTHS of $\frac{1}{2}$ inch or more are accurately cut to $\pm .010$ " with each stroke of press—actually less than $\frac{1}{2}$ of a second or faster than any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

Unit No. 12 accommodates tubing up to $\frac{1}{2}$ " O.D. with $\frac{3}{32}$ " wall; the No. 2 takes tubing up to 2" O.D. with $\frac{1}{8}$ " wall.

Ask for sample showing how clean-cut your tubing can be sheared with this machine.

VOGEL TUBE
CUT-OFF MACHINE



PATENTED

VOGEL

TOOL AND DIE CORPORATION

1823 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

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*the master mechanic's way
with oilstones*



deburring . . .

whether deburring and honing small knife blades for hand cutters, or chamfering and fitting close tolerance dies . . . hand stoning is the better way for precision work, for better cutting edges, for higher quality finishes, and for longer tool life. Send for your free copy of the Hand Stoning Handbook to Dept. MS-3.

BEHR-MANNING CO.

TROY, NEW YORK

A DIVISION OF NORTON COMPANY



BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals

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March, 1959

modern machine shop 187

new shop equipment . . .

struction for long life. The castings are transferred by a hydraulically actuated, swinging bar type transfer mechanism, while trapped between hardened and ground steel slide rails.

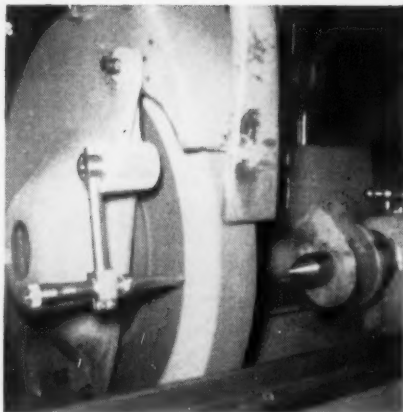
Other features include: a heavy duty planetary head for machining the oil seal at station No. 1; heavy duty milling heads at the milling and sawing stations; a built-in power operated chip conveyor; and automatic lubrication throughout. All electric and hydraulic installations are built to J.I.C. standards.

For more data circle 81 on Postpaid Card

★ modern machine shop ★

MICRO-FEED WHEEL DRESSER

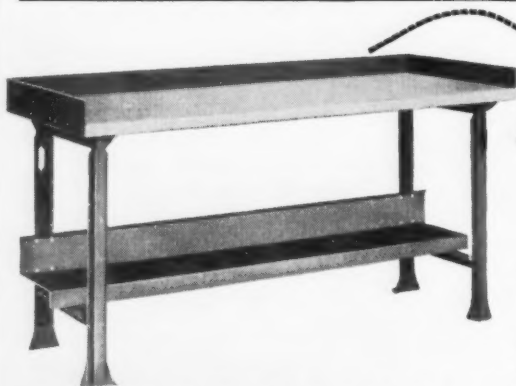
Nu-Dress Tool Co., 2235 East Artesia Ave., Long Beach, Calif.,



The Nu-Dress Micro-Feed Wheel Dresser

announces the Micro-Feed Wheel Dresser, designed for precision grinding. It is claimed to dress a wheel in five seconds and to double wheel life. The Model 100 mounts permanently

Good Work Requires A Good Bench.



LAMINATED MAPLE TOP

Solid, quiet, non-skid and non-conductive.

ELECTRIC SOCKET

Can be mounted on leg for convenient use of power tools.

Write Today for Our Catalog and the Name of Your Local BAY Distributor

BAY PRODUCTS INC.

1825 CAMBRIA ST., PHILA. 32, PA.

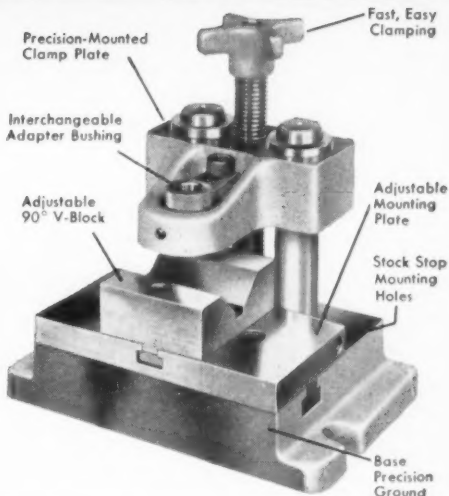
For more data circle 431 on Postpaid Card

REPCO *Time-Saving Tools*

ADJUSTABLE V-BLOCK DRILL JIG

**Saves Set-Up Time—
Increases Output**

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to $\frac{1}{16}$ " diameter. Handles stock from $\frac{1}{4}$ " to 2" diameter.

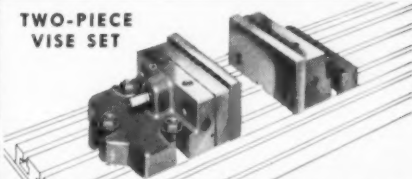


TRUE-CENTER ADJUSTABLE TOOL HOLDER



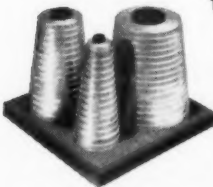
The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as $\frac{1}{2}$ " machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET



Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

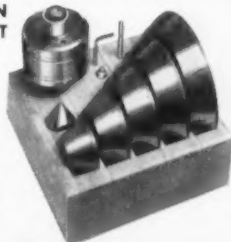
CHUCK JAW TRUING-RING SET



This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by $\frac{1}{16}$ " increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET

Heavy-duty live center plus six interchangeable adapters, ranging from a point to $\frac{6}{16}$ " dia. bell. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.



REPCO

Write for complete information—Exclusive agent territories open.

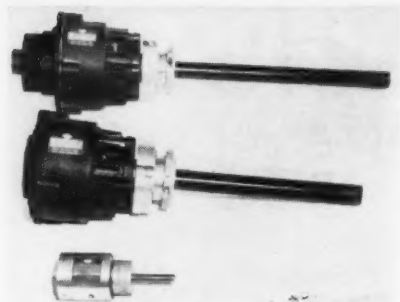
ROCKFORD ENGINEERED PRODUCTS CO.

23rd Ave. & 20th St., Rockford, Illinois

For more data circle 432 on Postpaid Card

new shop equipment . . .

on grinder guard. It remains ready for use in out-of-the-way position, saves hours of production time every day. Micrometer feed and constant control provide chatter free dressing, keep wheel in balance and free of glaze with minimum of wheel loss. Sharp corners are easily maintained without trial and error. Nu-Dress is designed to use standard industrial diamonds. For more data circle 82 on Postpaid Card



Wil-Numat Air Operated Collet Closers

★ modern machine shop ★

COLLET CLOSERS

Air operated collet closers are announced by Wil-Numat Corp., 5919 Blackwelder St., Culver City, Calif. They are available in double acting

units for large diameter collet work or air chuck operation.

Wil-Numat Air Operated Collet Closers for rotating hollow-spindle machines now cover a range of 5/16 to 2½ inch diameter bar capacity. Three sizes, single and double acting, for collet work and air chuck oper-

"IMP" MULES... real work and time savers



You save time, money and machines using "IMP" Mules. Perfect for drilling round or square stock. Priced at only \$8.95 to \$12.60.

Write today for "IMP" Mule bulletin.

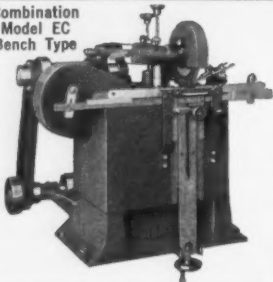


ILLINOIS METAL PRODUCTS

429 SUPERIOR ST.
CHICAGO 10, ILLINOIS

For more data circle 433 on Postpaid Card

Combination
Model EC
Bench Type



SAVE 80%

**on Usual Cost of Sharpening
Hack, Band and Circular Saws**

Your saving on only 2 gross of saws will pay for the Wardwell SAV-A-SAW. Sharpens automatically, even those with teeth as fine as 32 per inch. Speed up to 75 per minute. Keener cutting edges too.

We'll be glad to send Model EC literature.

THE WARDWELL MFG. CO.

3803 RIDGE ROAD • CLEVELAND 9, OHIO

For more data circle 434 on Postpaid Card



This 24-ft. boring mill is facing a disc of 300 stainless . . . a difficult machining operation . . . but this 3-man team quickly found the answer.

This 3-Man Team makes expensive machines pay off

Every time some new alloy must be machined, new problems arise as to the best tool, grade of carbide, feeds, speeds and depth of cut to use. Modern mills and machines are too costly to permit a lot of experimenting with resultant downtime.

The only sure and economical way is by pooling the know-how of a 3-man "tooling team." The Tool Engineer knows the job requirements; the Machine Operator contributes his machining skill; and your Kennametal Carbide Engineer provides information on the latest developments in carbide tooling.

Such a 3-man team can best determine the proper tools required for the job . . . then fill those requirements from the extensive line of Kennametal* tooling. Spearheaded by the Kendex*

(patented) line of "throw-away" insert tooling with more than 50 standard styles, plus many adaptations for special needs, Kennametal offers a selection that will provide the right tool for every job . . . for every shop, whether large or small.

Call in your Kennametal Carbide Engineer today to help you get the best tooling for every machine and material . . . applying Kennametal and helping to solve tough machining problems is his full-time job. Or write KENNA-METAL INC., Latrobe, Pennsylvania.

*Trademark

5779



INDUSTRY AND
KENNAMETAL
...Partners in Progress

For more data circle 435 on Postpaid Card

March, 1959

modern machine shop 191

new shop equipment . . .

ation have been added to the line. Hollow cylinder type: 2 inch diameter for up to 5/16 inch bar size, 6 inch diameter for up to 1 inch bar size, 8 inch diameter, 200 times air line pressure, for up to 2½ inch bar size.

For more data circle 83 on Postpaid Card

IMPACT WRENCHES

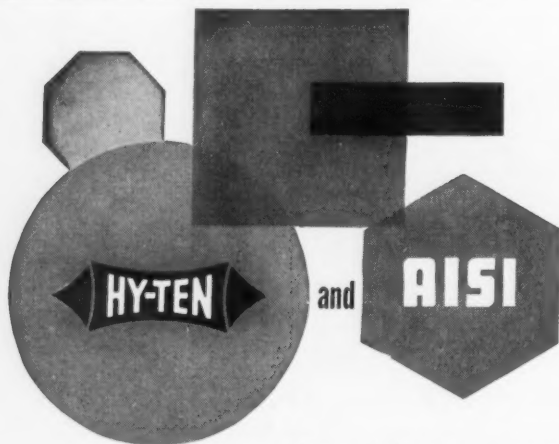
With the addition of seven new models, Albertson and Co., Inc., Sioux City, Iowa, has expanded its line of Sioux air impact wrenches and air screwdrivers. The company has also added five new models to its line of electric impact wrenches and electric screwdrivers.

Smallest of the air impact wrenches is the "production type" No. 313 and 314. While it weighs only 2¾ pounds, it will deliver 95 foot pounds of torque. It features a remote air exhaust system, which carries exhausting air and oil six feet away from the operator. This model fits in the hand and is operated with a paddle switch.

At the other end of the torque range are the big Sioux No. 320 and 322 air impact wrenches, which are said to achieve a new high in power to weight ratio. The manufacturer states



Sioux Impact Wrenches



... alloy steel bars, billets and forgings In sizes, shapes and treatments for every need!

All seven of our warehouses are staffed and supplied to fill your alloy steel requirements promptly whether you need standard AISI, SAE or our own special HY-TEN steels—"the standard steels of tomorrow".

Write today for Wheelock, Lovejoy Data Sheets containing complete information on grades, applications, physical properties, tests, heat treating, etc.

NEAR YOU . . . Warehouse Service — Cambridge • Cleveland Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati In Canada — Sanderson-Newbould, Ltd., Montreal and Toronto

WHELOCK, LOVEJOY & COMPANY, INC.

140 Sidney Street, Cambridge 39, Mass.

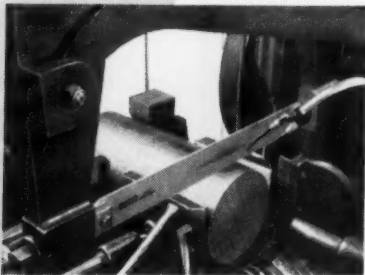
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*...to lower
metal cutting
costs*

VICTOR BLADES

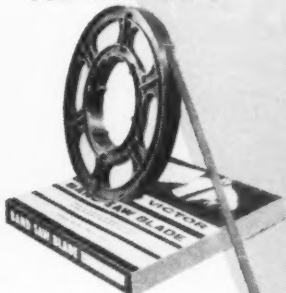
FOR POWER HACK SAWS



Victor Blades are made of the finest alloy steel. Precision control of blanking, toothing, setting and hardening guarantees a finished product with "top on-the-job" quality.

Using production equipment of unique design, Victor provides you with a full line of blades capable of doing the toughest metal cutting jobs, faster, for a longer service period.

FOR BAND SAWS



Victor Blades are made for service, packaged for ease of handling. New Reel-Pac Dispenser holds 100 feet of blade in sturdy, permanent reel. You simply draw out the length you need.

Victor makes a variety of Band Saw Blades welded to specification and in 100, 250 & 500 ft. lengths to meet your metal cutting requirements...Stand-ard, Skip Tooth, Profile, Gored Tooth.

Free Literature on Metal Cutting

Victor Metal Cutting Wall Chart - to put in your shop. Victor Metal Cutting Guidebook - contains a gold-mine of information on the best and most efficient way to handle any metal cutting job.

Clip and mail coupon today!



VICTOR

SAW WORKS, INC. • Middletown, N. Y., U.S.A.
Makers of Hand and Power Hack Saw Blades,
Frames and Metal and Wood Cutting Band Saw Blades.

VICTOR SAW WORKS, INC.

Middletown, N. Y., U.S.A.

- ☐ Please send me the Victor Metal Cutting Chart
☐ Please send me the Victor Metal Cutting Guidebook

Name

Title

Address

City Zone State 01700

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March, 1959

modern machine shop 193

new shop equipment . . .

that the No. 322 will deliver 1,200 foot pounds of torque with 120 pounds of air pressure at the tool.

Another feature is outstanding efficiency. In the mechanical design, less power is absorbed by the wrench itself, more is applied to the drive.

For more data circle 84 on Postpaid Card

RIVETING MACHINE

The Model 110A Riveting Machine, announced by Tubular Rivet and Stud Co., Quincy, Mass., meets the increased demand for a heavy duty machine to automatically feed and set semi-tubular rivets up to 5/16 inch diameter and 18/16 inch long with a heavy setting, as required by the automotive industry. It has a standard throat depth of 10 inches. A feature is a

newly developed eccentric actuated toggle linkage attached directly to the spindle. This mechanism enables the machine to develop a maximum force through the rivet setting range, and eliminates most of the vibration and jar.

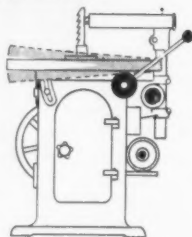
This machine is designed so that it is available or can be economically converted to the following modifications:



HIGH-SPEED LOW-COST KEYWAYS

WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at *minimum* cost with Davis Keyseaters. Here's why: (1) operation is designed for production *speed*; (2) machine sets up easily, does *not* require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from $\frac{1}{16}$ " to 1". High speed steel cutters stocked in all sizes; (5) the *best* keyseater of its type, yet *inexpensive*! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily
for tapered keyways
up to 3" per foot.

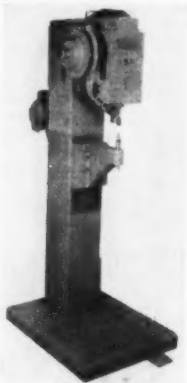


DAVIS KEYSEATER COMPANY

DIVISION OF *Hansford* MANUFACTURING CORPORATION

1239K University Ave., Rochester 7, New York

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The Model 110A
Riveting Machine

How Armco Can Help You Cut Machining Costs

It doesn't pay to avoid using free machining stainless steels because they cost a little more. They were developed to help you do a better job faster, and to *save you money in the long run*. They also help prolong the life of expensive tools.

In order to meet your needs in every family of stainless steels, Armco produces these grades:

CHROMIUM-NICKEL TYPES

- Armco 18-8 FM (Type 303)
- Armco 18-8 FM Se (Type 303 Se)
- Armco 18-12 Mo FM (Type 316 F)
- Armco 18-10 Cb-Ta FM Se . . (Type 347 F Se)

FERRITIC CHROMIUM TYPES

- Armco 17 FM (Type 430 F)

MARTENSITIC CHROMIUM TYPES

- Armco 12 FM (Type 416)
- Armco 12 FM Se (Type 416 Se)
- Armco 13-C-35 FM (Type 420 F)
- Armco 13-C-35 FM Se (Type 420 F Se)
- Armco 17-C-100 FM (Type 440 F)
- Armco 17-C-100 FM Se (Type 440 F Se)

New
steels are
born at
Armco

All these grades are supplied in a wide range of shapes and sizes in both bar and wire. They are available through your nearby distributor of Armco Stainless Steels. If you don't know his name, write us. We'll gladly help you contact him. Armco Steel Corporation, 1549 Curtis Street, Middletown, Ohio.

ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company
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Mirimichi Street, Plainville, Mass.
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tions: greater throat depths of 12, 14 or 16 inches; fixed center, double drive up to 3 inch center distance; right or left hand feed; and hydraulic power. For more data circle 85 on Postpaid Card

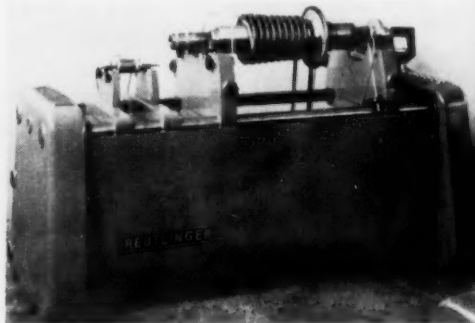
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BALANCING MACHINES

Wharton Unitools, Valley Stream, L. I., N. Y., announces Reutlinger Electrodynamic Balancing Machines. Some 14 production models are available of the GW Series to balance from one ounce to 600 pounds, while the WM Series will handle several thousand pounds.

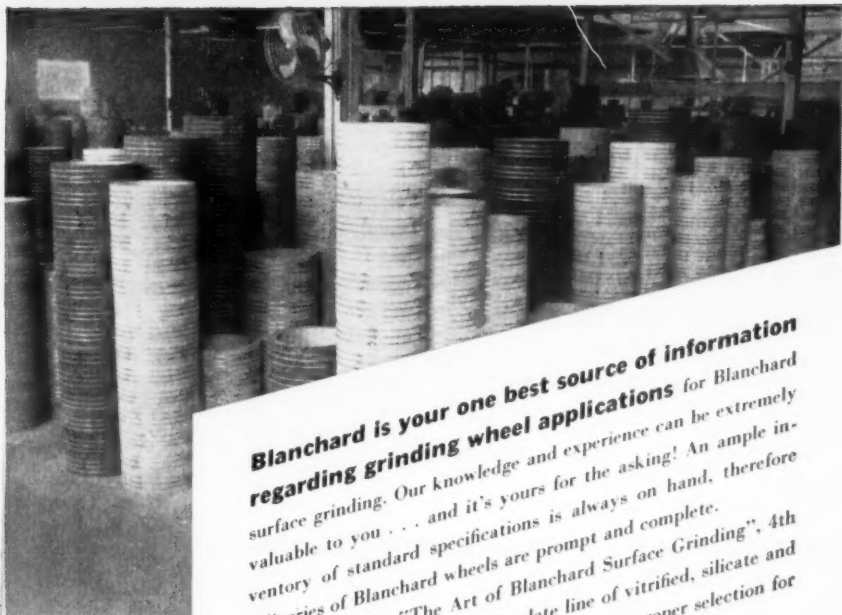
The Reutlinger Machines are designed for production use, with hydraulic belt lifters and fingertip controls. In continuous production, the time required for locating unbalance is usually less than 25 seconds.

The guaranteed accuracy is less than 0.00001 inch final eccentricity of the balanced workpiece (i.e., an unbalance causing a vibration amplitude of less than 0.000005 inch). Machines have speeds up to 30,000 r.p.m.



Reutlinger Electrodynamic Balancing Machine

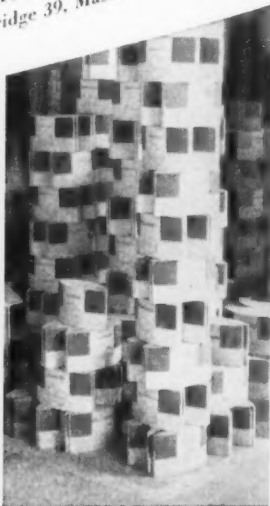
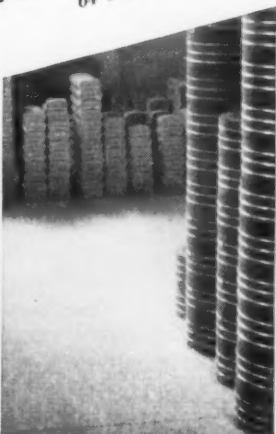
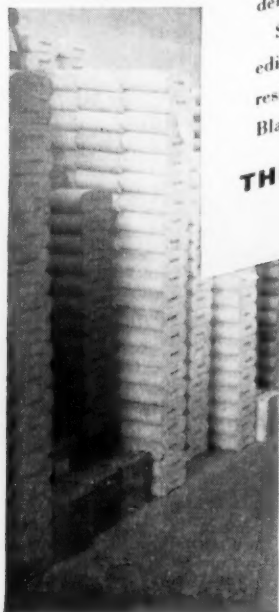
March, 1959



Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

THE BLANCHARD MACHINE COMPANY
 64 State Street Cambridge 39, Mass., U.S.A.



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Another advantage is that extra cradles can be supplied for any machine. This gives the user the advantage of many machines, as he can balance small fractional h.p. motors up to many hundreds of pounds.

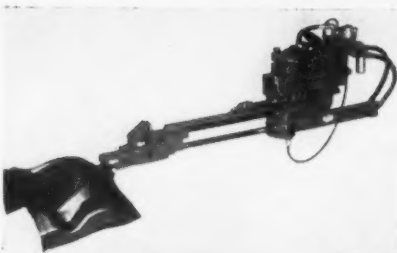
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HORIZONTAL UNLOADERS

Two small horizontal press unloaders are announced by Sahlin Engineering Co., Inc., P. O. Box 289, Birmingham, Michigan.

One unit, with a 14½ inch stroke, is adaptable to a number of uses. In one automotive plant it is being used

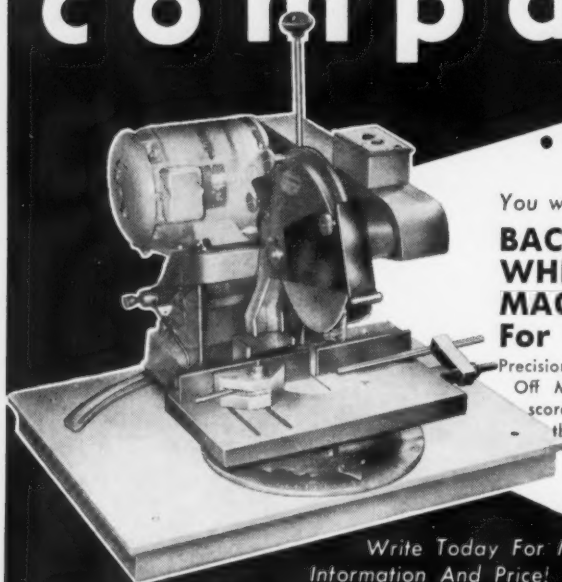


Sahlin Small, Compact Horizontal Unloader

to remove scrap from inside the die area of a press, while in another automotive plant an unloader with a 16½ inch stroke and a 3 inch lift is being used to unload the second stage of a two-stage die.

Both of these horizontal unloaders can be installed on a number of press

compare



- SPEED
- ACCURACY • QUALITY
- PRICE

You will know the best buy is . . .

BACKUS ABRASIVE WHEEL CUT-OFF MACHINES For Ferrous Metals

Precision-built Backus Abrasive Wheel Cut-Off Machines have won acceptance in scores of plants and shops throughout the country. Bars, shapes and tubing of steel and alloys are cut quickly and accurately at any angle. Operates with 12 inch abrasive wheel.

Write Today For More
Information And Price!

BACKUS MACHINE WORKS

ROUTE 17, CARLSTADT, N. J.

May Be Used For
Non-Ferrous Metals
With Simple Con-
version Unit!

SINCE 1914

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a PROCUNIER TAPPER pays for itself!

**Built-in features and operating advantages
increase production—reduce costs!**

Any way you look at it—you save and gain with Procunier Tappers. It is an uncontested fact, when you use Procunier you are enjoying the advantages of the finest tapping heads. Countless reports indicate tremendous savings on taps, automatic production increases, drastic reduction in parts spoilage, less operator fatigue, fewer "down hours" and precision accuracy in threads and tapped holes. Taking these gains and savings into consideration you can quickly see why Procunier heads "pay for themselves in just a short time!"

Procunier heads offer high speed, quiet operation, a new, powerful drive—with finger tip pressure; economical lightness, "long life" ruggedness and an accuracy and dependability you can consistently count upon! And, there's a versatile model for practically every tapping operation.

Send for FREE Brochure

Find out how you, too, can benefit with Procunier. Get the full construction details—see the many unusual tapping applications—get the "inside story" on why Procunier has led the field for more than 30 years. Write today—now.



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TODAY!**

PROCUNIER

Safety Chuck Co.

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Dept. 3
Chicago 6, Illinois

PROCUNIER SAFETY CHUCK CO.

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Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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Name.....

Address.....

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March, 1959

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types and, because of their compact design, are particularly suitable for small presses and gap presses.

Jaw components are interchangeable with standard Sahlin Iron Hand jaws, adding to the versatility and ease of maintenance.

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POT CRUCIBLE FURNACE

A pot crucible furnace is announced by Lindberg Engineering Co., 2444 West Hubbard St., Chicago 12, Ill. This furnace is designed for heavy and continuous duty at all heat levels up to 2,000 degrees F. (1093 degrees C.). Its versatility as a pot, crucible and retort furnace is claimed to make it ideal for a variety of both laboratory

and pilot plant operations. The furnace chamber is 8 inches in diameter by 9 inches deep. The alloy pot dimensions are 6 inches i.d. by 10½ inches deep, while the atmosphere retort has a working area of 6 inches inside diameter by 8¼ inches deep.

The furnace is supplied as a complete unit with transformer, heating element, contactor, thermocouple and chamber cover.

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FISKE'S DARL BASE

A base cutting oil for use in working both ferrous and non-ferrous metals. Can be used straight or reduced with mineral oil to suit the metal and work. Non-corrosive. Permits visibility when mixed. Has exceptional anti-weld properties, lubricity and film strength. For better finish of product and longer tool and die life, use "DARL."

Bulletins describing Fiske's Darl Base Oil and other specialty lubricants and coolants sent on request.



METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.

129B LOCKWOOD STREET, NEWARK 5, N. J.

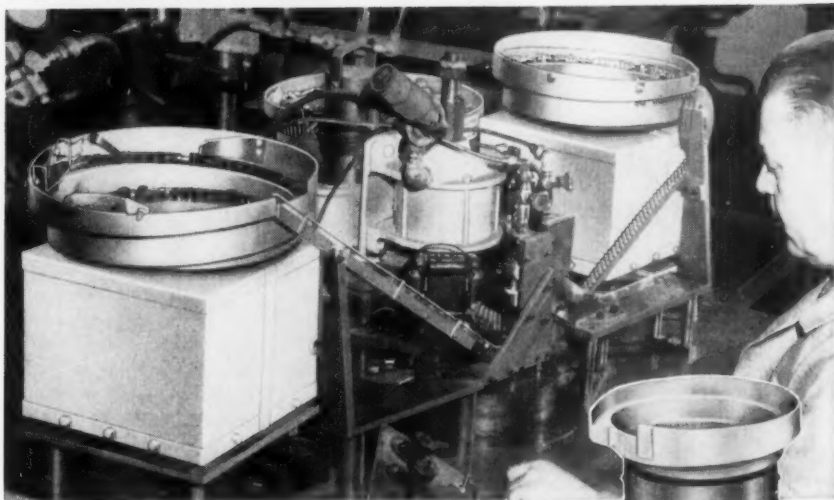
Plants: Newark 5, N. J., Toledo 5, Ohio



Lindberg Pot Furnace

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SYNTRON Vertical Vibratory **PARTS FEEDERS**



CUT PRODUCTION COSTS

—by automatically orienting and feeding components in single line to assembly, machining, counting, packaging and other operations at instantly controlled rates. Their efficient high speed vibration permits the handling of even delicate parts.

SYNTRON Parts Feeders are easily adapted to tie in with automatic operations, as shown above. They can be fitted with gravity feed tracks with integral escapement mechanism, limit switches and/or counting devices.

SYNTRON Parts Feeders are accurate and dependable — there are no mechanical wearing parts therefore, downtime and maintenance costs are low. To cut production costs and have accurate dependable, rate controlled, automatic feeding of small parts call SYNTRON.

Write for free informative literature

SYNTRON COMPANY

309 Lexington Avenue

Homer City, Penna.

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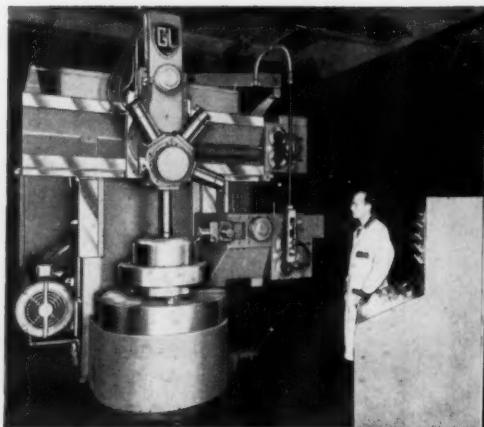
March, 1959

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VERTICAL TURRET LATHE IS TAPE CONTROLLED

Kaukauna Division, Giddings & Lewis Machine Tool Co., Kaukauna, Wis., announces numerically controlled vertical turret lathes. The complete



Tape controlled vertical turret lathe

S H A R P NAMEPLATE MARKING

Model
No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.

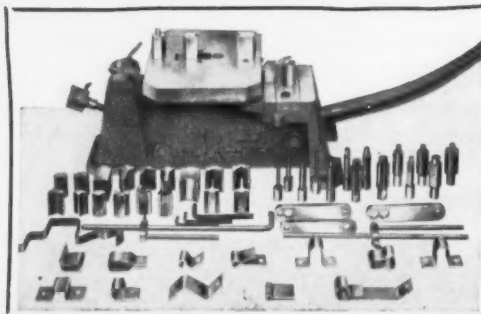


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versatility of this discrete positioning system promises major changes in the economics of machining a variety of work on vertical turret lathes and solidifies recent progress in carbide tooling. Cost reductions come from quick setup, faster operation of the machine between cuts, higher cutting speeds and consistent high quality of finished part.

The tape system exercises complete control over feeds, speeds, turret indexing, automatic dwell and coolant supply, as well as all auxiliary functions the machine is capable of performing. In programming, movements of the heads and table can be coordi-



Multiform BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

**AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL**

Write for brochure which illustrates
and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

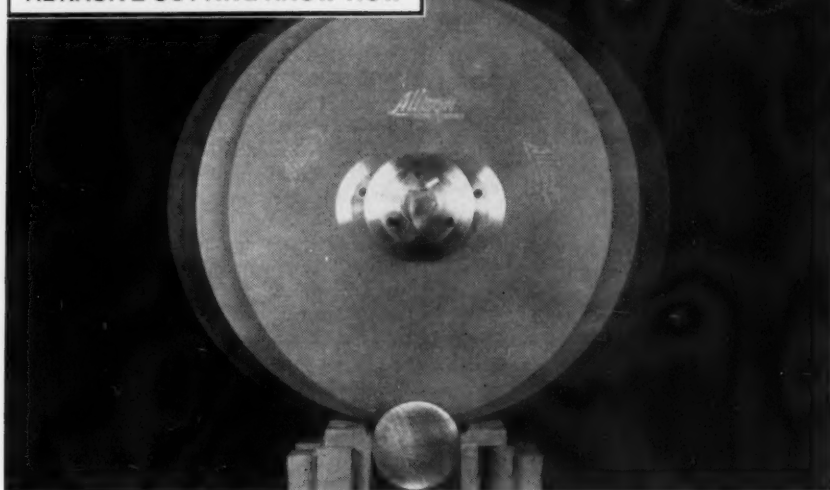
Kalamazoo, Mich.

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Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO
for Better
Values



Oscillation Improves Abrasive Cutting 4 Ways

On an oscillating-type abrasive cut-off machine, the cutting wheel is rocked back and forth across the cut while the wheel is fed downward. This horizontal movement produces some remarkable results.

1 **Greater cutting capacity** is one big advantage of oscillation. Because oscillation reduces the arc of contact between the wheel and the work, it is possible to cut solid steel bars up to 12" square. Without oscillation, 2" to 3" would be the practicable limit.

2 **Faster cutting** is another benefit of oscillation. Because the reduced arc of contact offers less resistance to the cutting wheel on large sections, the same wheel cuts faster, straighter, and with less feed pressure. Cutting rates of 4 to 8 seconds per square inch are maintained on even the largest cross-sections.

3 **Better quality cuts** are obtained with oscillation. Less heat is generated because of the small arc of contact, and the rocking action permits coolant to enter the cut more easily and prevent any heat build-up.

Burn-free cuts are produced with negligible burr, and there is little or no need for further finishing.

4 **Longer wheel life** is an important economy factor. The lower cutting temperature resulting from oscillation adds extra cuts to the life of every wheel.

The better flow of coolant within the cut washes away metal chips and loose abrasive, helping wheel efficiency.

HOW ALLISON-CAMPBELL CAN HELP

A complete selection of machines and wheels for any cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14" rounds . . . billets up to 12" square . . . plate up to 6" thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond—3" to 34" diameters—.006" to 3/16" thick.

Expert recommendations from your ALLISON-CAMPBELL Field Engineer can solve your cut-off problems for you. He'll be glad to show you how to get the faster, cleaner cuts you can expect from modern abrasive cutting techniques. Ask him.

WRITE FOR NEW BULLETIN

• Individual analysis of your cutting problems can be made in the new ALLISON-CAMPBELL Demonstration Laboratory. Write for a copy of DH-20, a new bulletin which describes how you can use these facilities. Complete details on ALLISON wheels and CAMPBELL machines are also available.

ALLISON-CAMPBELL DIVISION AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Conn.

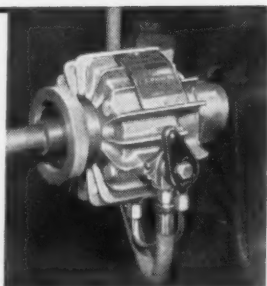
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March, 1959

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**WILSON
AIR
COLLET
CLOSER**



STEP UP PRODUCTION 20% +

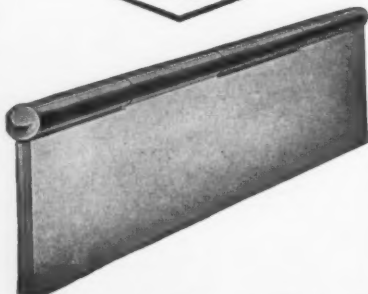
*... for most lathes to 1"
bar stock capacity*

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

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nated so as to minimize cycle time and avoid mechanical interference. The head and ram motions can be programmed for simultaneous feed to permit moving tools at 45 degrees. The rotation of the power turrets can be controlled in either direction.

With the override adjustment feature, the operator can add his information to the data system in the form of fine adjustments to either height or radius. Once such adjustments have been made, they automatically become part of the program.

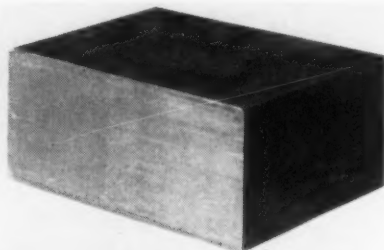
Other features are: operator "tunes in" the programmed setup; downtime for tool changes minimized; programming is simple and direct; operator can observe each machine function from the console; all electric power transmission designed specifically for tape; ability to shut down the machine at the end of a work day or for any other reason (including power failure) without loss of data; machines are compact.

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TOOL STEEL

Darwin and Milner, Inc., 2345 St. Clair Ave., Cleveland 14, Ohio, an-



PRK-33 Cobalt, High Carbon, Tool Steel

March, 1959



When ACCURACY Counts...

Acme Industrial Company for over 40 years scored unerringly with precision, capacity, and its "person to person" customer relationships.

Just as in any sport the ingredients for success are versatility, capacity, accuracy and ingenuity, Acme has proven time and again to have the right ingredients.

Acme's modern plant contains over 300 metal working machines and 200 pieces of laboratory testing and inspection equipment for maintaining tolerances from .001 to .00001 inch.

Being specialists in hydraulic actuating cylinders and pistons, Acme's contract, research and development work are designed to meet the Industrial Security Board's requirements.

Acme can produce any part, one or a million, any finish, hardened and ground, or assemblies in ferrous or non-ferrous materials to order from your specifications.

Why accept second best, only Acme Industrial is first in the field of custom precision manufacturing.

Send your blue prints and specifications for quotation.



ACME

INDUSTRIAL COMPANY

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FREE! Write for our new facility booklet now

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TITLE

COMPANY

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CITY ZONE STATE

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March, 1959

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nounces that PRK-33 Tool Steel is now being offered in three new sizes: namely, 3 by 7, 4½ by 6, and 4 by 10.

The manufacturer states that cobalt gives PRK-33 its outstanding wear resistance and strength that resists edge chipping or crumbling. It is said to be ideal for heavy-gage stamping and severe applications for long runs.

PRK-33 finds wide use in all kinds of high production dies, shear blades, forming rolls, low speed cutting tools and knurling, burnishing and spinning tools. Its wide use in hot forming dies and in aircraft engine valves is due to its resistance to heat below 1,000 degrees Fahrenheit.

PRK-33 Tool Steel is available in sand castings, forgings and hot rolled, annealed bars, rounds to 10 inches, flats to 4 by 10 inches and squares to 5 inches.

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What do You Think?

This is a Clearing Torc-Pac O. B. I.

We think it's the finest O.B.I. in its capacity range. We also think it has the finest air friction clutch and brake available anywhere. Naturally, *we'd* think so.

We *know* it has more precision, more *quality* than any machine in its price range.

What *you* think of the value of this machine can only be determined when you see it. Call a Clearing dealer and be prepared for a pleasant surprise.



Torc-Pac O.B.I.'s are available in 22, 32 and 45 ton capacities.

Write for descriptive literature.

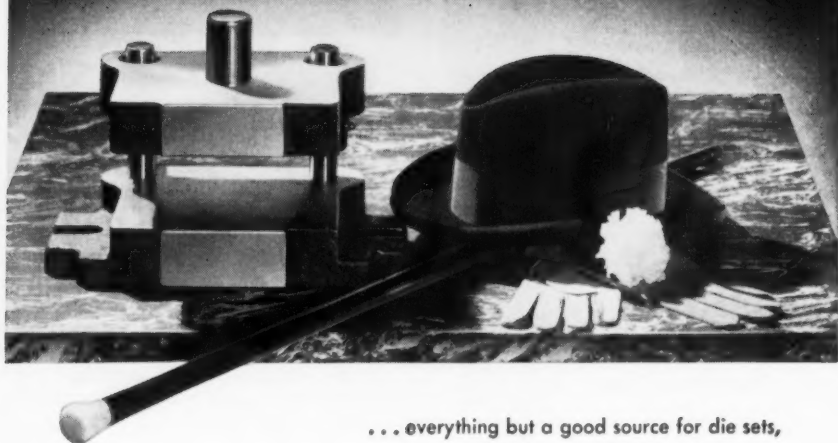


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DIVISION OF U. S. INDUSTRIES, INC.
6499 W. 65th Street • Chicago 38, Illinois

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FOR THE DIEMAKER WHO HAS EVERYTHING...



Detroit Die Set builds and stocks over 2,000 different die sets plus specials of all types. Ask for new catalog without obligation.

Detroit
DIE SET

CORPORATION

2895 WEST GRAND BOULEVARD • DETROIT 2, MICH.

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

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... everything but a good source for die sets,
here's a suggestion.

Die sets are basic to mass production.

They don't need

gadgets, gimmicks or glamorous styling.

Production depends on

sound design, quality materials, accuracy

and reliability, and

at reasonable cost and delivery time.

That's the way it is

with Detroit die sets. Why don't you
try them today.

March, 1959

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SPECIFY Dependable GRAYMILLS COOLANT PUMPS

for Replacement and
Original Equipment

Here is a pump that complements the finest machines—rugged, dependable, abrasive proof. Obvious quality . . . priced right too. 50 standard models. Sold by Industrial Distributors.

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Satisfied?

. . . That You Have
ACCURACY To

Required Tolerances?

• One serious error can be costly! Check with always-accurate "Milwaukee" Precision Equipment—Surface Plates, Straight Edges, Angles, Box Parallels. Standard of the industry!



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APECO Ply-On Laminating Machine in use

LAMINATING MACHINE

The APECO Ply-On Laminator, a desk top plastic laminating machine, is made by the American Photocopy Equipment Co., 2114 West Dempster St., Evanston, Ill. In one simple operation, it can seal a sheet of paper or card in a thin, durable plastic case to provide long life and tamperproof protection.

Through lamination, machine shop operators can preserve such documents as shop orders, price lists or specification data to be placed on or near machines, blueprints, contracts, drawings, general correspondence and a host of other valuable papers. The Ply-On Laminator weighs about 30 pounds and requires only 10½ by 15 inches of desk surface. Easy to operate, the machine requires only 10 seconds for fusing a thin plastic film to one or both sides of a letter-sized original. For more data circle 91 on Postpaid Card

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THREAD ROLLING MACHINE

A Lanhyrol Thread Rolling Machine has been developed by Landis

March, 1959



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Bunting offers unmatched engineering and manufacturing facilities for special bearings and parts of Cast Bronze and Sintered Oil-filled Metals.

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Bunting's "Engineering Handbook on Powder Metallurgy" details manufacture and use of sintered metal bearings and parts.



CATALOG NO. 58 listing ... 866 sizes of Bunting Cast Bronze Standard Stock Bearings; 667 sizes of Bunting Sintered oil-filled Bronze Stock Plain, Flange and Thrust Bearings. Made to ASTM Standards. 267 sizes of Bunting Cast Bronze Tubular and Solid 13" Bars. 84 sizes of Bunting Sintered oil-filled Bronze Tubular and Solid 6 1/2" Bars.



CATALOG NO. 258 listing ... 343 sizes of Electric Motor Bearings for all makes and sizes of electric motors from 1/50 to 100 HP.



BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE OR SINTERED METALS.

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March, 1959

modern machine shop 209

new shop equipment . . .

Machine Co., Waynesboro, Pa., to handle double end studs up to 13½ inches long. Through extended spindles, the machine will produce these studs at rates of 102-¾ to 9/16 inch and 80-½ i.p.m. The operation is performed by the continuous rolling method, whereby the parts are auto-

matically fed into the machine from an inclined magazine. They are held and carried into rolling position by an indexing workrest cage.

The thread roll dies are of the segmental type, operating at a fixed center distance and held hydraulically. Through their design, two parts are rolled per die revolution. Upon completion of the threading operation, the parts drop into a conveyor and

are carried out the front of the machine.

Two methods of rolling are available. The first and fastest is by segmental or cam periphery dies with mechanical indexing for parts up to and including ⅝ inch diameter on either single or double end work and for ¾ inch diameter, single end only. In this range, combinations of coarse and fine pitches, left and right hand, large and small diameters or identical threads may be rolled.

The second method is used for work larger than ¾ inch in diameter, on one end only. Plain cylindrical infeed dies are used with an automatic infeed cycle and the electro-pneumatic indexing is substituted for the mechanical indexing.



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EASILY!**

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49A**

**"2 in 1" METAL CUTTING BAND SAW
WITH WHEELS AND HANDLE
(Optional Equipment)**

With heavy duty, rubber tired, ball bearing wheels and one piece fold-down handle, the Wells Model 49A is a metal cutting band saw that's **REALLY MOBILE . . .** and **VERSATILE**. Use the 49A as a horizontal cut-off machine (capacity 3½" x 6") or swing the head to vertical position . . . it's an upright band saw.

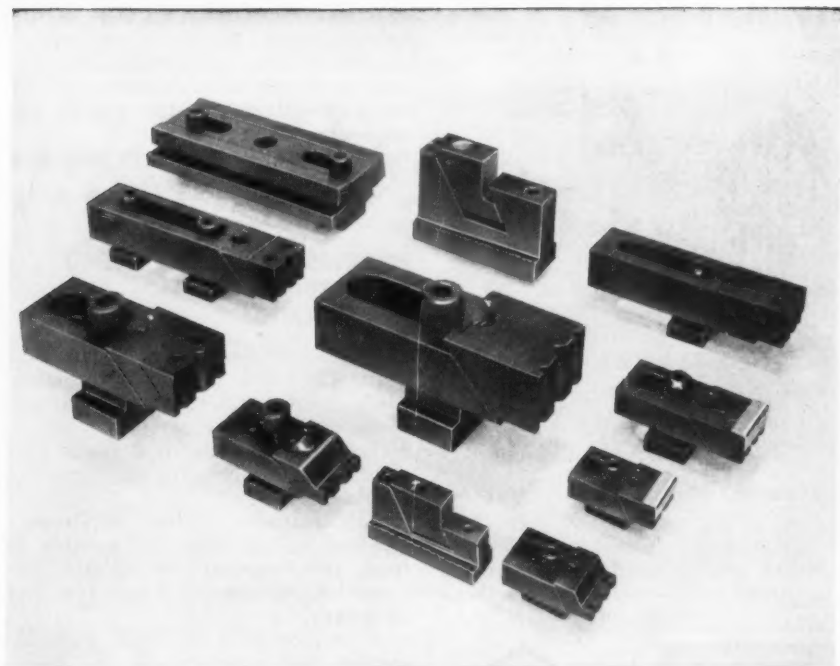
The optional wheel and handle unit, available for new machines and those already in service, is a tremendous time and labor saver. Ask your local Wells Distributor for details . . . or write for Bulletin 253-H.



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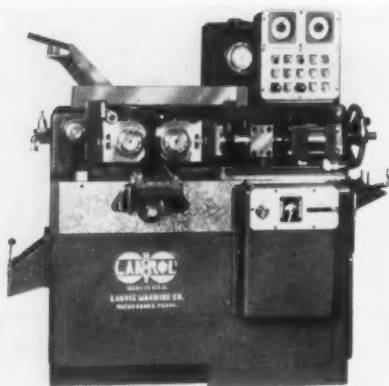
**871 DORSA AVE.
LIVINGSTON, NEW JERSEY**

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March, 1959

modern machine shop 211

new shop equipment . . .



The Lanhyrol Thread Rolling Machine

A changeover from one diameter to another requires only interchanging the thread rolling dies, magazine chute

rails and work carrying rings in the indexing cage. Minor adjustment of the chute rails and indexing mechanism is needed when changing over to studs of different length, but of the same diameter.

For more data circle 92 on Postpaid Card

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PROCESS INCREASES AFFINITY OF CARBIDE BLANKS FOR BRAZING

A process developed by National Twist Drill and Tool Co., Rochester, Mich., provides a surface on carbide blanks that improves bonding. It makes brazing easier and faster and eliminates the cleaning previously required.

This treatment is called the Brazeez Process. Where induction brazing is used, it is particularly effective because wiping during brazing is not necessary.

A film or shell of cobalt, approximately 100 micro-inches in depth, "resurfaces" the carbide blank. This is achieved through a method of "leaching" the cobalt, which is used as the bonding agent, to the surface of the blank. This surface thereby becomes "wetttable" and the carbide blank's affinity for brazing without wiping is greatly increased.

The Brazeez process makes it no longer necessary to clean the carbide

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March, 1959

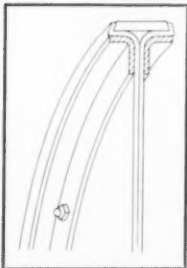
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REINFORCED WHEELS

Special reinforced wheels, to be used on band saws and band resaws or for extreme heavy duty requirements, are announced by Carter Products Co., Inc., 426 Helmer Bldg., 50 Market Avenue, N.W., Grand Rapids, Mich. The rims of these heavy duty wheels are reinforced with a double thickness of quality steel to make them five times stronger, and are ideal for use on resawing operations or on very thick work—on shakes—or any work requiring extreme blade tension. The reinforced wheels offer dynamic bal-



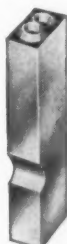
Cross section of a portion of the Carter Wheel showing reinforced construction

DEMAGNETIZER

The O. S. Walker Co., Inc., Worcester 6, Mass., is introducing a plate type demagnetizer to provide low cost demagnetization of ferrous parts. The



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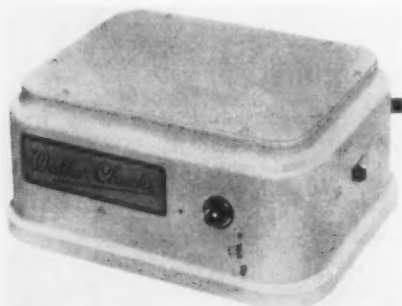
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O. S. Walker Plate Type Demagnetizer

high powered unit features deep penetration and may be operated on a 25 percent duty cycle. The demagnetizer is ideally suited to toolroom use for

demagnetizing cutters, drills, gears and similar parts, as well as for small production runs.

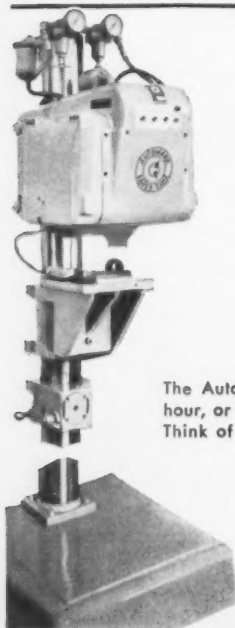
The size of the top plate is 7 by 9 inches. The unit operates on 220 volts a.c., 6 cycle current and draws 15 amperes.

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TOOL GRINDER

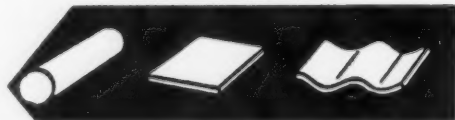
The Micropoint Tool Grinder, capable of absolute control of tool geometry, is announced by De Vlieg Machine Co., Fair St., Royal Oak, Mich. It will grind single point tool profiles geometrically correct to precise gage accuracy and with either cone or cylindrical relief at the radius and can handle any tool up to and including a one inch square shank.



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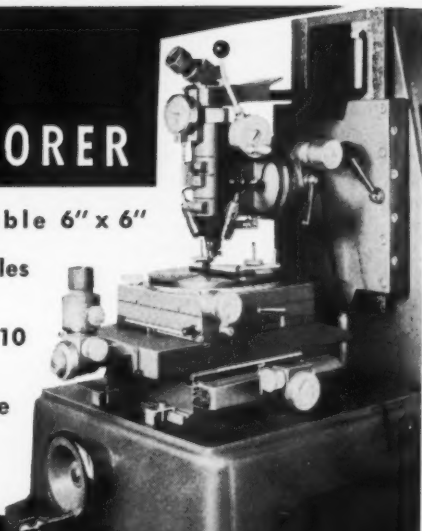
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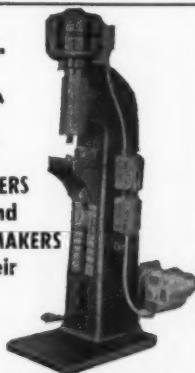
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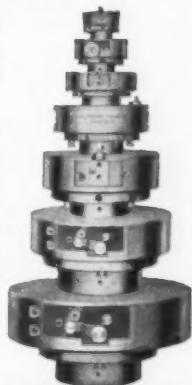
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March, 1959

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Two-way tool feed
in 9, 12, 16, 20, 24,
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One-way tool feed
in 6, 9 and 12 sizes.
Automatic feed —
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feed reverse. Save
time and costly set-
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modern machine shop 215

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The possibility of human error has been substantially reduced, for direct dial settings provide a method of fast, simple and accurate adjustment for each radius, cutting angle, offset and clearance in exact accordance with the geometric requirements of the tool. The wheel spindle head of the grinder has an adjustable reciprocating move-





ment and the generating cycle is hand operated with a cushion at the end of the stroke.

The machine is of rugged construction throughout with hardened and ground cylindrical guide ways, well protected from sludge, insuring long life. It is also capable of fast metal removal.


The Micropoint system of single tool point geometry is based on making all dimensions of the cutting edge relative to the center of the tip radius.

The accurate blending of the radius into the flats of the head and end cutting edges provides a tool profile that governs and enhances the size and finish of the machining operation.

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Whitman and Barnes, Plymouth, Mich., announces the addition of solid carbide drills to its line.

Designed for use in cast iron and other non-ferrous materials, these tools are available in fractional sizes from 1/16 to 1/2 inch; letter sizes A to Z; wire gauge sizes No. 1 to 60.

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heats like ...

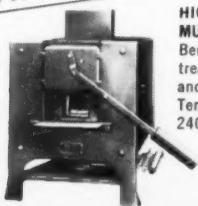
is more modern than ...

is more economical than ...



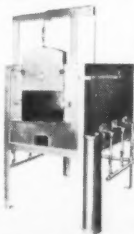
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March, 1959

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the new **RELIEVOMATIC***
saves you costly refinishing!

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normal marred surface
* U. S. Patent No. 2,712,767



perfectly clear surface
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Whitman and Barnes Solid Carbide Drill

The flute and overall lengths are the new standards recently adopted and are shorter than Jobbers Length

Drills, thereby affecting a greater rigidity which, according to the company, can be helpful in obtaining better drilling practices.

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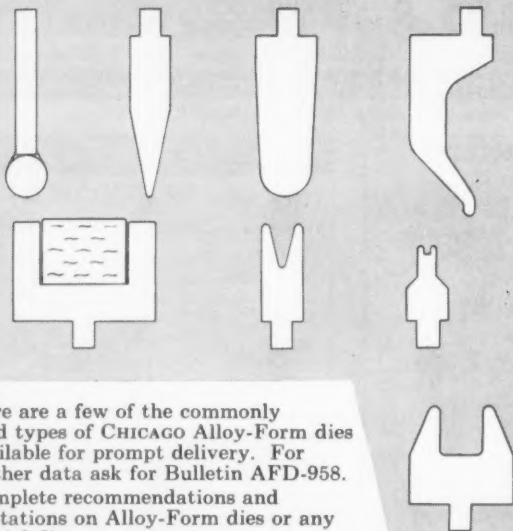
THREE FLUTE END MILLS

The Melin Tool Co., Inc., 3392 West 140th St., Cleveland 11, Ohio, an-

nounces its three flute high speed steel end mills for milling aluminum and aluminum alloys. The tools are specially designed with a fast spiral and high rake angle. Flutes are hollow ground and highly polished. The design offers rapid stock removal and the ends are relieved to eliminate excessive chip loading. These mills have all three flutes cut to center to minimize drag and insure fast, clean plunge cuts. At full cutting depth, two flutes are always in the cut. The

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Melin End Mills

March, 1959

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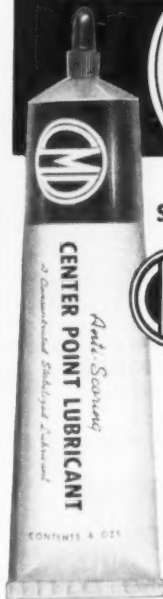
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tool series is available in three flute single end regular length, long length and extra long length in square end and ball end. A total of 76 tool sizes are listed.

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MEASURING TOOLS

Industrial Division, Hamilton Watch Co., Lancaster, Pa., has expanded its Kwik-Chek line to include seven new measuring tools.

Heading the list is a precision dial comparator, with these features: direct reading in 0.00005 inch; range of 0.004 inch; fully jeweled and shock resistant; dual gaging contact pressure and fine adjustment on both stand and gage. The other two current additions to the line are a dial comparator



(Right) Kwik-Chek Dial Comparator and
(Left) Kwik-Chek Micro Dial Indicator Gage

(without fine adjustment) and a micro dial indicator gage.

The additional Kwik-Chek measuring instruments, to be available in June, are an indicating micrometer, a small bore gage, a horizontal jaw gage and a recess depth measurement gage. For more data circle 99 on Postpaid Card

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Model No. 2 Moto-Tool only \$19.95

Model No. 2 Moto-Tool Kit, with 23 accessories, including high-speed cutters, in handy storage case \$27.50

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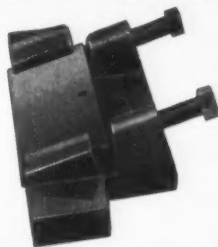
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FOR ANY WORK ON ANY MACHINE TABLE

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ready for layout in a few min-
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Increases efficiency and accuracy.

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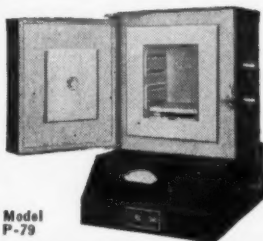
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P79	6"x6"x9"	\$205.00	\$225.00
P918	9"x9"x18"	\$480.00	\$528.00
P414	14"x14"x14"	\$925.00	\$963.25
P124	12"x12"x24"	\$715.00	\$822.25
P816	18"x18"x18"	\$775.00	\$887.50
P136	18"x18"x36"	\$1125.00	\$1312.50

Automatic Controls Available on all Models

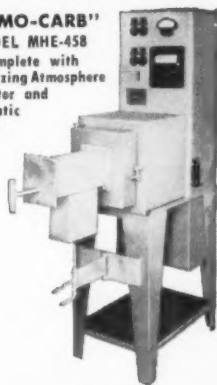


Model
P-79

- Infinite zone temperature control
- Zone temperature indication by Pyrometer Selector Switch
- Automatic hold and cut-off instrument available
- Patented element holders
- Infinite variety of time-temperature curves obtainable
- Rugged construction

"ATMO-CARB" MODEL MHE-45B

Complete with
Carburizing Atmosphere
Generator and
Automatic
Control



\$1325.00

Other Sizes and
Arrangements Available



MANUFACTURING CO.
Chester 71, Pa.

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new shop equipment . . .

SOLID CARBIDE REAMER

Noting results with such materials as aluminum, heat treated steel up to a hardness of 65 Rockwell C, stainless steel, steel alloys and plastics, M. A. Ford Mfg. Co., 1545 Rockingham Rd., Davenport, Iowa, recently pointed to industrial production gains as a result



M. A. Ford Solid Carbide Reamer

of using Ford solid carbide reamers. Citing solid carbide construction as the long tool life factor, Ford engineers state that long-run production efficiency more than justifies the selection of this type of reamer. Adding that

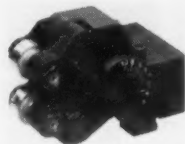
coolants are not necessary in reaming with carbide, the manufacturer recommends a good lubricant to produce a clean, fine finish hole. Also to be avoided are such causes of reamer breakage as insufficient chip clearance, poor alignment, faulty sharpening, incorrect speed and feed and excessive work entry speed.

For more data circle 100 on Postpaid Card

★ m m s ★

THREAD ROLLING ATTACHMENT

The Reed Rolled Thread Die



Thread Rolling Attachment

MINIATURE KNU-VISE CLAMPS DO MIGHTY JOBS

These tiny Knu-Vise toggle clamps are capable of exerting 100 to 150 Lbs. clamping force with a reach of 7/8 and 9/16 inch respectively in front of base. Other features are:

- Clamping height, 19/32 above base.
- Double shear bearing pins prevent clamping spindle side-thrust or tilt.
- Largest diameter pins for size of clamp—80% minimum bearing area.
- When open, spindle head withdraws beyond front of base, permits vertical removal of largest parts.
- All models have replaceable grips.



Four Models
H-100 Twin-flange base

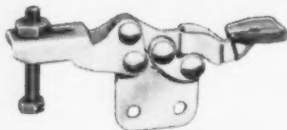


HL-100 Left-flange base



HR-100 Right-flange base

SH-100 Straight base
for side mounting.



All shown 1/2
actual size

Write—TODAY, to Dept. A—for complete information.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

**KNU-VISE
PRODUCTS**

LAPEER MANUFACTURING CO.

3048 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: PECK and LEWIS CORPORATION
4436 Long Beach Ave., Los Angeles 96, Calif., ADams 3-7142
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

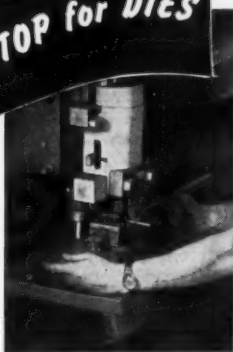
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Adjustable Automatic Stock

FEED STOP for DIES

Dahlstrom AUTOSTOP

No drill jig . . .
no slotting . . .
no milling.
Specify whether
for use on blank-
ing, progressive
or compound dies.
Mounts on
stripper plate
in 15 minutes.
\$1.75 each;
\$18 doz.



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BRANCH MANUFACTURING CO.

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\$1.75

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SPEEDY-SAFE NON-POISONOUS CASE HARDENING

Indispensable for Tool
Rooms, Machine Shops,
Schools, etc. Now avail-
able in 1, 5, 10, 25, 50
and 100 lb. containers.

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KASENIT CO.

Est. 1912

55 King St., Mahwah, N. J.

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CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

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POWER

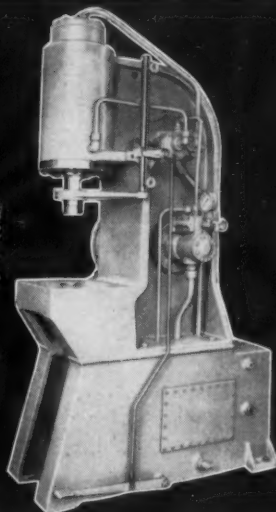
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1½-75 TONS

GREENERD, for 76 years, has manufactured
Power-Performing ARBOR and HYDRAULIC
PRESSES: maintenance-free; may be fur-
nished to I.C. Standards, and designed to
handle the following variety of work:

- * ASSEMBLING
- * BENDING
- * BROACHING
- * BURNISHING
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- * EMBOSSING
- * FORMING
- * MOLDING
- * RIVETING
- * SIZING
- * STAKING
- * STRAIGHTENING

Write for Catalogue #656



Greenerd ARBOR PRESS CO.

41 CROWN ST. NASHUA, N.H.

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new shop equipment . . .

Co., Holden, Mass., announces a small size Model B5 Thread Rolling Attachment for use on the No. 00 Brown and Sharpe Single Spindle Automatic. Diameter capacity from 0 to 5/16 inch and a maximum thread length of 1/2 inch is provided.

This two roll attachment is adjustable and self-compensating. It is de-

signed to produce precision threads. With the lower pressures on the screw machine spindle it has advantages over the single roll applications. The free floating movement of the Reed B5 Head in the cross slide adapter provides parallel alignment of the thread rolls with the center line of the work throughout the entire rolling cycle.

Precision matching of the thread rolls is obtained with a simple device.

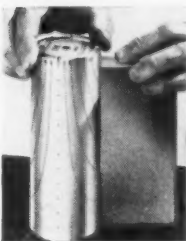
An advance compensator allows rolls of the same diameter to be used interchangeably. A precision micrometer gage is used in setup for accurate positioning of the attachment in relation to the work.

For more data circle 101 on Postpaid Card

★ m m s ★

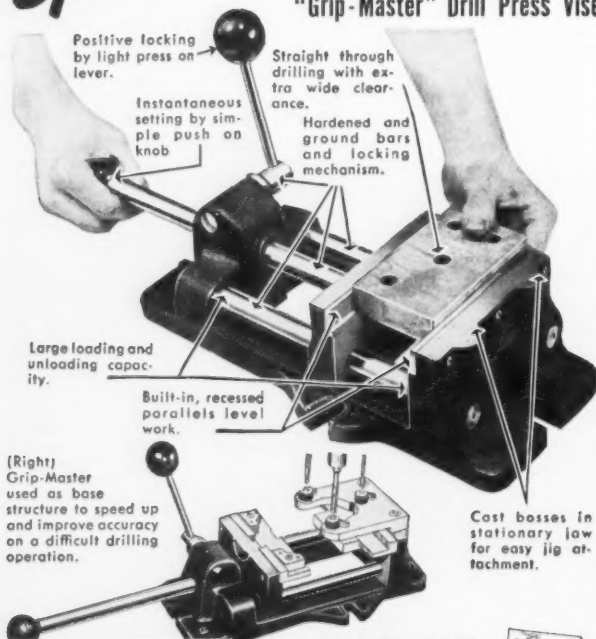
CYLINDRICAL SQUARE

Brown and Sharpe Mfg. Co., Providence 1, R. I., announces a 6 inch direct reading cylindrical square, No.



Cylindrical Square

Speed-up OPERATIONS with heinrich "Grip-Master" Drill Press Vise



Cast bosses in stationary jaw for easy jig attachment.

NEW CATALOG FREE!

Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.

Write Department 119-C
Racine, Wisconsin

Drill Press Vises • Fixture Locks • Nibblers
Punches • Rod Cutters



heinrich
TOOLS, INC.

FORBES NATIONAL MACHINE TOOL CO.

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WRITE FOR FREE CATALOG

- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

Rota

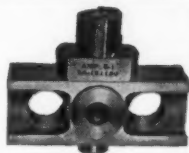
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1328—58TH ST.
BROOKLYN 19, N. Y.

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NEW FLUSH PIN AMPLIFIER

OFFERS 5 to 1
AMPLIFICATION



- No dial indicator needed • No master required
- Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

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Columbus 3, Ohio

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- COTTER PINS
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Since 1872

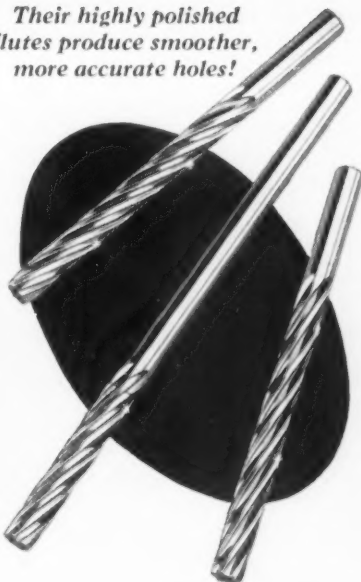
HORSE NAIL CORP.

NEW BRIGHTON, PA.

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March, 1959

*Their highly polished
flutes produce smoother,
more accurate holes!*



ACE

Drill Length and Chucking REAMERS

For the finest reamers that money can buy, always specify "ACE"! They're made of top quality, pre-hardened high speed steel and produced by the Ace-originated "ground-from-the-solid" process. Results? Stronger, more highly polished right hand spiral flutes. Keener, longer lasting cutting edges. Plus smoother, more accurate holes at lower cost!

Call your local Ace Drill Distributor today!



ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

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modern machine shop 225

new shop equipment . . .

558, which shows variations from square in units of 0.0002 inch directly on the cylinder and eliminates the need for transfer instruments.

One end of the cylindrical square is precisely ground and lapped "out-of-square", so that when the cylinder is rotated, its angle with the base

surface will at some point match the angle of the workpiece and shut out light against the work. Out-of-square-ness is then read directly in 0.0002 inch by following the dotted curve nearest to the top edge of the working piece to the top of the cylinder.

The cylindrical square is approximately $2\frac{1}{2}$ inches in diameter and $6\frac{1}{4}$ inches high overall and measures to a 6 foot height. Surface finish is 6 r.m.s. or better and the diameter is ground and honed to within 0.0001 inch. Ends are ground, lapped and serrated to reduce friction and decrease inaccuracy from dust. Cylinder is case hardened with clear, black dotted curves and numerals.

For more data circle 102 on Postpaid Card

★ m m s ★

CYLINDERS

Miller Fluid Power Division, Flick - Reedy Corp., 2024 North Hawthorne, Melrose Park, Ill., announces 16, 18 and 20 inch bore hydraulic cylinders for 250 p.s.i. severe service and 350 p.s.i. moderate service. Designated as Model CL, these cylinders have features such as all Teflon sealing against external leakage, SHEF tubing end

These FREE reports . . . give YOU PROOF of SAVINGS



when Barry machinery mounts are used in machine installation or moving.

- SAVED \$54.00 per machine installation . . . American Type Founders
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783 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

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DRILL**

"The drill that hasn't been stopped yet"

If you have a drilling problem, we think we can solve it. We can sell you the drills or do your drilling on a contract basis.

MOSSBERG, INC.
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CINCINNATI 31, OHIO

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REICH — THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.

Price \$9.00
Write for folder.



J. R. REICH MANUFACTURING CO.
201 E. Straop Road Dayton 29, Ohio

For more data circle 492 on Postpaid Card

**SAVAGE
NIBBLING MACHINES**

Patented Tool Holder Assembly →

NIBBLE your COSTS

- No sparks
- No open flame
- No oxidation • No second operations

No. 236

Totally enclosed head . . . for safety.
Direct-over-center positive drive . . . gives more power.
One-piece 360° revolving head . . . for fewer parts and longer life.

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W. J. SAVAGE CO.
KNOXVILLE TENNESSEE

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March, 1959

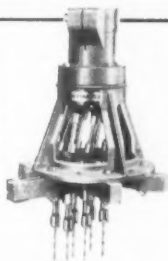
Only

THRIFTMASTER Universal Joint Type DRILL HEADS

have these exclusive* features

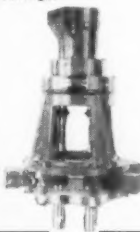
*Standard Full Ball Bearing Construction, Including Spindles

Driving assembly is Full Ball Bearing mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.



3 Standard Models . . .

Models U-608 and U-1000—Ball Bearing
Models U-620B and U-1012B—Plain Bearing,
 $\frac{1}{16}$ " or $\frac{1}{2}$ " min. centers
Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles

Semi-Standard Heavy Duty Full Ball Bearing . . .

$\frac{1}{2}$ " in Cast Iron— $7\frac{1}{8}$ " or $9\frac{3}{4}$ " Dia.
 $\frac{1}{2}$ " in Steel—7" or $9\frac{1}{8}$ " Dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

WRITE FOR FULL INFORMATION

Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER Products Corporation
1034 N. PLUM STREET
LANCASTER, PA.

Also Makers of

DORMAN AUTOMATIC REVERSE TAPPERS
For more data circle 494 on Postpaid Card

modern machine shop 227

new shop equipment . . .

seals, piston rod dirt wiper, self-regulating, wear compensating piston rod seal that never requires adjustment, space-saving square design and case hardened chrome plated piston rods. The cylinders are available in non-cushioned models only.

The company also announces the availability of 16, 18 and 20 inch bore

cylinders, specially designed for water service.

They are available as the Model CLW in non-cushioned models only, for 250 p.s.i. severe service and 350 p.s.i. moderate service.

For efficient performance under the rust and corrosion conditions of water service, the cylinders have cadmium plated, non-wearing parts, hard chrome plated stainless steel piston rods, Hycar piston and piston rod

seals, chrome plated pistons and hard brass barrels.

For more data circle 103 on Postpaid Card

★ m m s ★

TICKLISH FINISHING JOB? do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard — there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:



MICRO-FINISHING

Paramount Felt Bobs make ultra-fine finishing of surfaces quick, easy and economical.



DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.



NEW BOB ASSORTMENT KITS

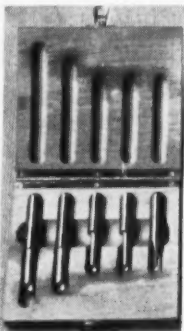
K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at \$10.95 (K-1) and \$12.95 (K-2) they are far below the cost of buying bobs separately.

See your jobber or write for literature

**BACON FELT CO. JOBBER INQUIRIES
457 Water St., Taunton, Mass. INVITED**

For more data circle 495 on Postpaid Card



Titan Boring Bars

C A M S

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC

23-16 44th Road Long Island City 1, N. Y.

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"SEALFLEX" TUBING



**Leakproof—
Stays in place
For Coolants, Cutting
Oils, Solvents**

Made of steel with brass fittings — males, nozzles, stopcocks, etc., made in 1/8", 1/4", 3/8", 1/2", 3/4" I.D. Write for bulletin and prices.

VERMONT FLEXIBLE TUBING CO.

Lyndonville, Vermont

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THE FINEST
STANDARD
**BRIGHT and
HEAT TREATED
CAP SCREWS**

AS WELL AS

**PRECISION
MILLED-FROM-THE-BAR
CAP SCREWS • SET SCREWS
COUPLING BOLTS and STUDS**

ARE PRODUCED BY

Wm. H. Ottmiller Co.

YORK, PENNA.

Precision Milled Specials? Of Course!
We'll be glad to
quote on yours — promptly.

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March, 1959

POT-TYPE SALT

BATH FURNACE



The features listed below are but a few of the in-built advantages of the

LUCIFER 2055 SERIES.

- Eliminates atmospheric problems (oxidation, scaling and decarburization)
- Rapid constant heat
- Choice of 10 models
- Heat ranges to 1,700° F.
- All controls included (automatic indicating controller, selector switch with two thermocouples)
- Quick easy installation
- Low initial cost . . . low upkeep
- Top production performance with unskilled labor
- Minimum replacement down-time.

Lucifer Furnaces, Inc., manufactures many standard electric heat treating furnaces and maintains a design department to create special units. For engineering assistance, parts or product information write or call . . .

LUCIFER FURNACES, INC.

Neshaminy, Pennsylvania

Diamond 3-0411

BY
LUCIFER

FURNACES

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modern machine shop 229

new shop equipment . . .

permitting them to be resharpened many times for maximum tool life. Constant clearance throughout the life of the tool is assured, since the tool is sharpened by grinding only the cutting face. The cutting head is double-brazed, both at the point of contact and at the center of the head.

Thus, the head cannot come loose. Long tool life, comparable to external tool forms, is assured. Extra length allows greater boring depth than possible with standard tools.

Titan Boring Bars are ideally suited to working harder steels, alloys and cast metals. They are available in sizes from $\frac{1}{8}$ to $\frac{3}{4}$ inch, in shank sizes of $\frac{3}{8}$ or $\frac{1}{2}$ inch, with tips ground for boring or facing. Titan Boring Bars for jig borers are supplied in sets in handy wooden boxes for safe-keeping and long life.

For more data circle 104 on Postpaid Card

★ m m s ★

ALL NEW

MARK II Shoplifter

\$195⁰⁰ FOB Chicago



All lifters at this price are *not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

Write for specifications and other details.

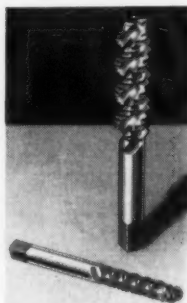
ECONOMY
ENGINEERING

4507 W. Lake St., Chicago 24, Ill.

TAP

The Threadwell Tap and Die Co., Greenfield, Mass., announces its Turbo-Cut Tap.

The Threadwell Turbo-Cut Tap has been developed to provide optimum chip removal without sacrifice of



Turbo-Cut Taps

For more data circle 500 on Postpaid Card

BREMIL
The IMPROVED Compound Lever Shears

**ALL ALLOY
FULLY
GUARANTEED**



Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to 1/4" steel plate.

BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

For more data circle 501 on Postpaid Card

JIG BORING
to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.
ROUTE 22, MOUNTAIN SIDE, N. J.
Telephone: ADams 2-7300

For more data circle 502 on Postpaid Card

ANOTHER **PANNIER** MASTER MARKER!



**PANNIER'S
SUPREME HOLDER
WITH ROTO-PIN LOCK**

Safe, fast type changing. Holder in variety of styles. Machined from High-Grade Bar Tool Steel. Hardened steel maintains type alignment. Striking Head of Tool Steel. . . . Replaceable to add long service life to Holder.

New Roto-Pin type lock is integral part of all Pannier Supreme Holders . . . eliminates loose, bent, dropped, or lost pins . . . flip it open to change type . . . flip it back to securely lock type in clear-marking position.

Write for complete data.



MARKING DEVICES
THE PANNIER CORPORATION

202 Pannier Building • FAirfax 1-5185 • Pittsburgh 12, Pa.

Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

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ALLEN HEAVY DUTY PUNCH PRESSES

**Powerful
Dependable and Economical
Fully Guaranteed**



**Model BT-12
12 Ton
\$437.50
less motor
job**



**Model BT-5
5 Ton
\$199.50
less motor
job**



**Model B-2
2 Ton
\$97.50
less motor
job**



**Model LTX
Special Duty
1 Ton — \$89.50
less motor — job**

**Hundreds of different
Model Combinations
1 to 12 ton Capacities**

**See your Supply Dealer
or write for Catalog giving
complete information,
specifications and
prices on our line of
Heavy Duty Punch
Presses.**

Thousands in use the World over

ALVA ALLEN INDUSTRIES, Dept. MM, Clinton, Missouri

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new shop equipment . . .

accuracy and to reduce tap breakage to the absolute minimum. The Turbo-Cut Tap incorporates a relatively high spiral flute to achieve maximum chip removal. During the tapping operation, chips created by the cutting edges of the Turbo-Cut are moved away from the tapping operation, chips created by the cutting edges are

moved away from the axis at a much greater angle. They are then forced upward in a fast spiral with greater thrust from the flutes. Reduced to the most simple form, the chips are moved upward in faster and easier stages with continuous thrust from the sides of the flutes. Upon reaching the surface of the workpiece, they are propelled out of the hole away from the tap.

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TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1/8" and pipe taps from 1/8" to 1". Five o.d. sizes.

LESS TAP BREAKAGE
LESS TAP WEAR

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BYCO INDUSTRIES

2200 SNELLING AVE., MINNEAPOLIS, MINN.

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Here's the dope!

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BLUE LAYOUT DOPE

TAMMS INDUSTRIES, INC.
228 N. LaSalle St., Chicago 1, Ill.

DRYS FAST-RESISTS OIL
WON'T CHIP, CRACK OR FLAKE OFF!

For more data circle 506 on Postpaid Card

232 modern machine shop

★ modern machine shop ★

PORTABLE HYDRAULIC PUNCH

Portable hydraulic punches, announced by W. A. Whitney Mfg. Co., 604 Race St., Rockford, Ill., provide a method of hole forming in large or hard-to-handle pieces, which eliminates awkward material handling, slow, costly drilling and reduces cycle time. Known as Hydramic Punches they are available in a range of capacities from 5 to 90 tons. The 90 ton unit will punch up to a 1-1/16 inch hole through 7/8 or 1 inch hole through 1 inch of mild steel.

A complete unit consists of a punch unit with pushbutton control box, a hydraulic power unit and interconnecting flexible hydraulic lines. Punch units, with from 5 through 30 ton capacity, are light enough to be carried from job to job. Heavier units of 50, 70 and 90 ton capacity, have the



- Tips & Techniques -

MACHINE TOOL RECONDITIONING

Send for free folder describing illustrated book featuring hand scraping methods. (3rd printing)

MACHINE TOOL PUBLICATIONS
324 Wabasha, 215 Commerce Bldg.
St. Paul 1, Minn.

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March, 1959

HOLES



PRECISION HOLE FINISHING
WITH FLOATING CUTTER

Clark "FINISHING BARS"

P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 508 on Postpaid Card

JIG BORING

and

Large Precision Machining

Done to your specifications

We have 22 Jig Borers

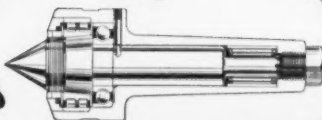
KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

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NIELSEN

Heavy Duty
Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog
M on live centers

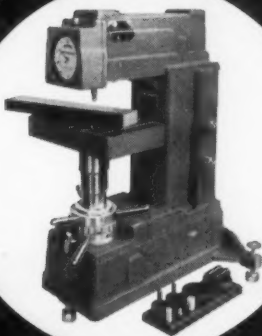
NIELSEN, INC. LAWTON, MICHIGAN

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March, 1959

2 Applications

(Regular and Superficial)

1 Tester



KENTRALL MODEL CT-2 \$750.

Hundreds of installations over the past few years have proved the economy of the only hardness tester which combines all scales of Rockwell Test (15 to 150 kg. loads).

The Kentrall cuts costs because it does the job of two conventional testers, requires only half the space and maintenance. Write for more detailed information, plus a list of prominent users who have switched to Kentrall.

TB147

KENTRALL

THE TORSION BALANCE COMPANY

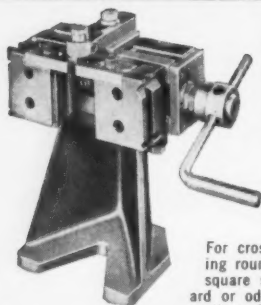
Main Office and Factory:

Clifton, New Jersey

Sales Offices: Chicago, San Francisco

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modern machine shop 233

SPEED UP DRILLING & TAPPING JOBS!



JOHN'S DRILL JIG Self Centering

For cross or end drilling round, hexagon, or square stock or standard or odd-shaped rough castings from $\frac{1}{8}$ " to 8"

O.D. Will cut tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Jigs available in three sizes 6", 8", 14"; jaw openings 2", $3\frac{1}{4}$ ", $7\frac{1}{2}$ ".

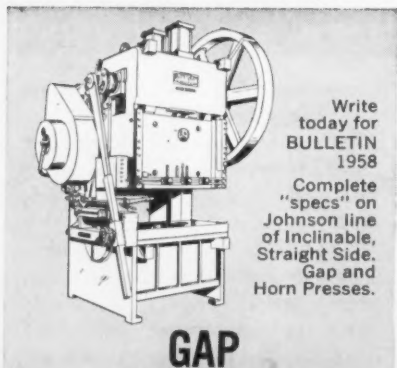
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HEUSER MANUFACTURING CO.

1640 N. Paulina St.

Chicago 22, Ill.

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today for
BULLETIN
1958

Complete
"specs" on
Johnson line
of Inclinable,
Straight Side,
Gap and
Horn Presses.

GAP

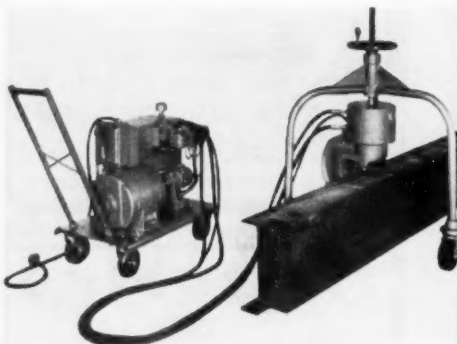
Johnson
POWER PRESSES

JOHNSON MACHINE & PRESS CORP.
620 W. INDIANA AVE., ELKHART, INDIANA

For more data circle 513 on Postpaid Card

234 modern machine shop

new shop equipment . . .



W. A. Whitney 90 Ton Hydramic Punch

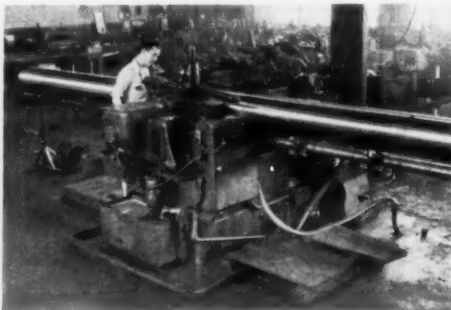
power unit mounted on a casted cart, while the punch unit is suspended from a casted tripod. In cases where a tripod cannot be used, the punch head can be suspended from a crane, hoist or A-frame.

For more data circle 106 on Postpaid Card

★ modern machine shop ★

TUBING AND BAR STOCK FIXTURE

A and B Centerless Grinding Co.,
8301 Lynch Rd., Detroit 34, Mich.,



A and B Tubing and Bar Stock Fixture

March, 1959



*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. • URBANA, OHIO

For more data circle 514 on Postpaid Card

NEW Box Table

REPLACE YOUR BROKEN-OUT TABLES
AT A MINIMUM COST

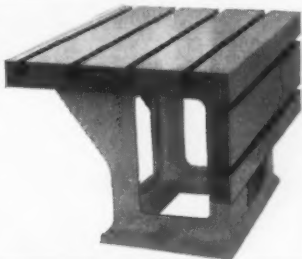
Size: 30" x 24" x 20". 500 Lbs. Side: 30" x 12", with
3/4" t-slots. Price: \$325.00, f.o.b. factory.

Write for descriptive bulletin

LAGOE OSWEGO CORPORATION

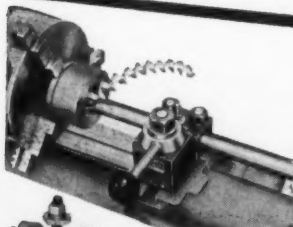
50 E. 12th ST.

• OSWEGO, NEW YORK



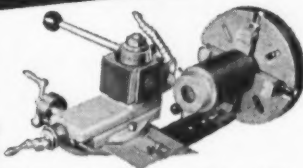
For more data circle 515 on Postpaid Card

FOR MAXIMUM VERSATILITY & RIGIDITY



ALORIS
QUICK CHANGE

**TOOL POSTS &
TOOL HOLDERS**



Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
- Greater Rigidity
- Leading Lathe Mfrs. Recommend It
- Sizes to Fit Every Lathe
- Unconditionally Guaranteed

NEW!

Aloris Holder for Carbide Triangular Inserts.
For both positive rake and negative rake inserts.
Greater rigidity, versatility, efficiency & economy



The most complete line of
tool posts and holders.
Write For Catalog & Price List

ALORIS TOOL CO., INC.

419 Gettys Avenue
Clifton, New Jersey

For more data circle 516 on Postpaid Card

new shop equipment . . .

announces a tubing and bar stock fixture, which was designed and engineered for use with a No. 2 or 3 centerless grinder, regardless of age or year built. The simplicity of its design, set up and operation makes it possible for anyone, familiar with a centerless grinder who can read micrometers, to grind or polish tubing or bar stock in

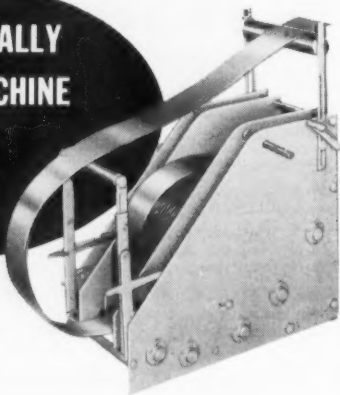
either long or short run lots. The only tools required for continuous operation are a standard wrench, hammer and screwdriver.

It is claimed that this tubing and bar stock fixture, when incorporated with a centerless grinder, can do the following: grind and polish tubing and bar stock $\frac{1}{8}$ inch to 12 inches round with 10-15 micro finish; grind all types lead screws from $\frac{1}{8}$ inch to 12 inches in diameter up to 52 feet

long before and after threading; allow tolerances to be held of plus or minus 0.001 the entire length of the part; make possible unlimited stock removal the full length of 52 feet; allow substitution of more economical material; convert a present No. 2 or 3 centerless grinder, with a minimum amount of time and effort; without limitation, handle the sizes most predominantly required by industry, which are from $\frac{1}{8}$ inch to 12 inches round; assure procurement of special size material, by doing the job in the plant; increase capacity to handle larger and more profitable jobs; and save time and money.

For more data circle 107 on Postpaid Card

AUTOMATICALLY FEED ANY MACHINE FROM THIS SLACK LOOP



for greater
accuracy
and production!

Koil Kradles form a slack loop between coil and machine from which any automatic feed can freely draw! The slack loop eliminates drag and resistance of pulling against heavy coils. Reduced drag improves accuracy of any feed device . . . records show up to 80% more footage handled per shift!

Koil Kradle's variable timer delays shut-off up to 10 seconds after motor switch trips off . . . forms a new slack loop before stopping, eliminates many unnecessary motor starts and stops! Adjustable plates center various coil widths; reversible motor for rewinding; power driven rolls; anti-friction bearings and numerous other features!

ASK FOR CIRCULARS, sizes and prices. Stock widths up to 50", coil weights to 20,000 lbs.



benchmaster

World's largest
manufacturer of small punch
presses and mills.

1835 W. Rosecrans Avenue • Gardena, California

For more data circle 517 on Postpaid Card



save 20 to 30% on new
CARBIDE TOOLS

RICO has a complete line of:

- Quality rotary carbide & HSS tools
- Available for immediate delivery
- Big savings on new tool costs
- Up to 50% savings on regrinds
- Special tools to specifications
- Distributor inquiries invited about better profit margins with RICO TOOLS.



Attach ad to your letterhead for more information.

RICO TOOL CO.

5915 DIXIE HWY. • SAGINAW, MICH.

For more data circle 518 on Postpaid Card

BARKER Bench Type Mill

for Production Milling
of Small Parts by
Unskilled Help

\$345.00

As Shown



Screw Feeds
Optional

at Extra
Cost.

**BARKER
ENGINEERING
COMPANY**

Write for
Details

500 GREEN RD., CLEVELAND 21, OHIO

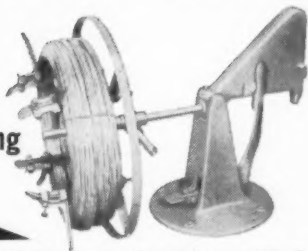
For more data circle 519 on Postpaid Card

March, 1959

For REEL Efficiency...

NILSON WIRE and RIBBON STOCK REELS

3 TYPES—8 MODELS

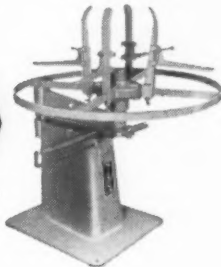


3 Tilting Reels

Portable reels for easy loading of heavy coils. Coil Capacity: 150, 225 and 525 lbs., respectively.

2 Clutch Reels

Oscillating motion eliminates slippage of stock. Coil Capacity: 175 and 250 lbs., respectively.



3 Stationary Base Reels

Economical reels for general-purpose production. Coil Capacity: 75, 150 & 225 lbs., respectively.



In addition to these standard models, we can build variations to meet special requirements. Write today for your copy of the Nilson Catalog on Wire and Ribbon Metal Stock Reels!

NILSON

THE A. H. NILSON MACHINE CO.

603 Bridgeport Avenue • Shelton, Conn.

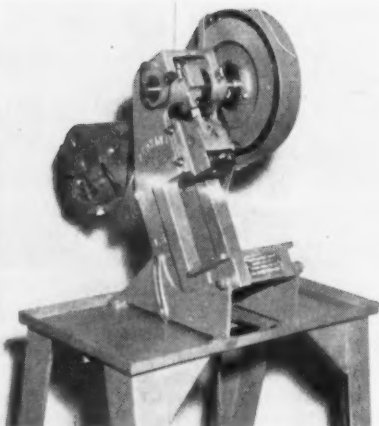
For more data circle 520 on Postpaid Card

modern machine shop 237

new shop equipment . . .

1 1/2 TON O.B.I. PRESS

Perkins Machine Co., Warren, Mass., has announced its Junior Precision Press. Features include a cap front to the ram, bronze bushed bearings, adjustable brake, adjustable gib to the ram and single trip safety clutch with replaceable inserts in the



Perkins O.B.I. Junior Precision Press

MICROBALL

The HEIGHT GAGE with

BUILT-IN GAGE BLOCKS

Easy Micrometer
Readings Replace
Difficult Vernier Scale!

● DIRECT MICROMETER
READINGS.

● Positive indexing at .500"
intervals by self-contained
hardened steel balls.

● Intermediate settings by
micrometer gage incorporated
in the design.

● Easy readings of consistent
accuracy to within .001"

Complete information
on request.

12"
&
24"

EVERY
INDUSTRY
HAS A
DEFINITE
NEED
FOR THIS
GAGE!

FOSTER SUPPLIES CO.

6122 Milwaukee Ave., Dept. MMS, Chicago 46, Ill.

For more data circle 521 on Postpaid Card

flywheel. Generous die space is provided. This press has inclinable legs which can be mounted on a bench or on a steel stand. It can also be supplied in a permanent upright position. For more data circle 108 on Postpaid Card

★ modern machine shop ★

OPTICAL TOOLS

Carl Zeiss-Jena Optical Measuring Instruments are available from George Scherr Co., 200-MM Lafayette St., New York 12, N. Y.

The optical tools include such items as toolmaker microscope with 6 by 2 inch range and universal measuring

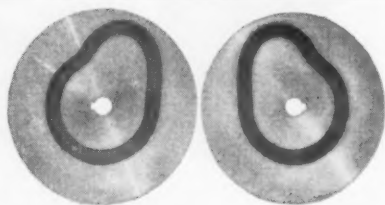


ROWBOTTOM AND CAMS ARE SYNONYMOUS

Box, barrel, side or indexing . . . all types . . . hardened and ground if required . . . Rowbottom makes them all . . . as well as machines for producing them. Just tell us what you need. Also Rotary Profilers.

THE ROWBOTTOM MACHINE CO., P. O. BOX 4097, WATERBURY, CONN.

For more data circle 522 on Postpaid Card





**DRILL and
PILOT
BUSHINGS**
*Frictionless
—Rotary*

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

GATCO ROTARY BUSHING CO.

42330 Ann Arbor Road, Plymouth, Michigan

For more data circle 523 on Postpaid Card

HOLES



DOES JOBS NO DRILL CAN DO



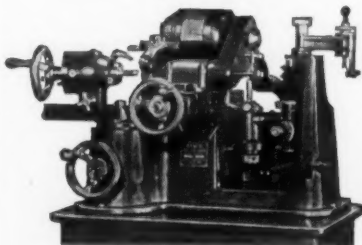
Clark "HOLE MAKER"

P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 524 on Postpaid Card

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points



MODEL 1100

- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.

708 E. 163rd St., Cleveland 10, Ohio

For more data circle 525 on Postpaid Card

March, 1959

MAXWELL

Automatic RECESSING TOOLS

REDUCE
INTERNAL
CUTTING
COSTS



These fully automatic, quickly adjustable tools save time, cut costs on precision grooving, undercutting, inaccessible spot facing, chamfering, back facing and necking.

They are used with jig or fixture on automatic or manual feed machines. Long-life circular form cutters, or tool bit holders with tool bits may be used. Location and diameter of recess are individually controlled by stop collars, adjustable to within ± 0.001 -inch. Five sizes available to pilot into 1" to 2 1/4" bushings. Furnished with shank to suit.

WRITE TODAY FOR
BULLETIN NO. J-F

1151-MC



**THE MAXWELL
COMPANY**

493 E. Fifth Ave., Ashtabula, Ohio

For more data circle 526 on Postpaid Card

modern machine shop 239

True Conical Grinding on a STERLING Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.



STERLING "DV"
\$550⁰⁰

F.O.B. Eau Claire, Wis.

CAPACITY

90°—140° Included angle, variable clearance angle set with built-in gage. Grinds $\frac{1}{8}$ " to 2½" drills; 2, 3 & 4 flutes.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

Ask your STERLING Dealer for complete information on all STERLING Drill Grinders and STERLING Tool and Cutter Grinders or write direct

McDONOUGH
MANUFACTURING CO.

1521 GALLOWAY • EAU CLAIRE, WISC.
For more data circle 527 on Postpaid Card

240 modern machine shop

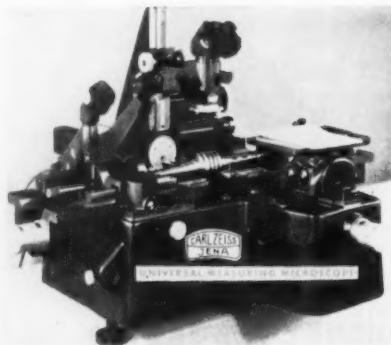
new shop equipment . . .

microscope with 4 by 8 inch range, used for checking of cutting tools, control of gages, thread measurements and precision measuring of jigs, fixtures and extremely accurate work.

A length measuring machine, for external and internal measurements, uses a graduated glass scale and an optical lever for direct readings to 0.000050 inch, having an outside measuring range of 40, 120 and 240 inches. The vertical and horizontal Metro-scope employ precision glass scales, built into the measuring head or spindle respectively, which are read through a spiral micrometer microscope to 50 millionths of inch. The Optimeter uses auto-collimation as basic principle, with an integral scale as measuring means. The Zeiss Optical Dividing Head, designed for use on heavy milling, grinding and drilling machines, with an accuracy of 5 seconds of arc, has a preselector for setting minutes and seconds.

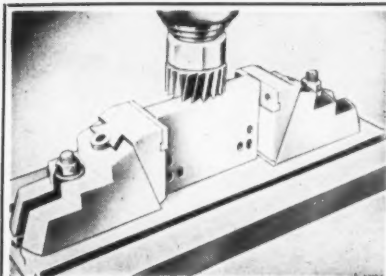
An instrument of measuring technique is the interference comparator. It is a measuring instrument which utilizes as its unit of length the unchanging wavelength of light.

For more data circle 109 on Postpaid Card



Carl Zeiss Jena Measuring Microscope

March, 1959



MASTER GRIPPING CLAWS System Hubner

WHY use them?

1. Clamping action **vertical** as well as **horizontal** — pressing workpiece **down** directly on the machine table. No hammering — no air between. 2. Gain more working room. 3. Faster and more secure setups. Easier to handle. 4. Unlimited jaw opening. 5. No straps overlapping on the workpiece; more machining surface. 6. Extremely versatile — take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents

KARL A. NEISE
404 4th Ave., Dept. MM-39
New York 16, N. Y.

NEISE
MODERN TOOLS

For more data circle 528 on Postpaid Card

Air-O-chek

The Nozzle Valve with the internal fulcrum lever

Available in two models and many sizes

30
Years 1929-1959
AIR-WAY



AIR ECONOMY

SAVE through superior performance, low maintenance, low initial cost. Air-O-chek air guns are of simple design, sturdy construction, and are easy to use.

Write for details

AIR-WAY PUMP & EQUIPMENT CO.
1046 N. Kilbourn Ave., Chicago 51, Ill.

For more data circle 529 on Postpaid Card

Adjustable MULTI-DRILL for Production Drilling

9" DRILLING AREA

AVAILABLE WITH 2 TO 8 SPINDLES

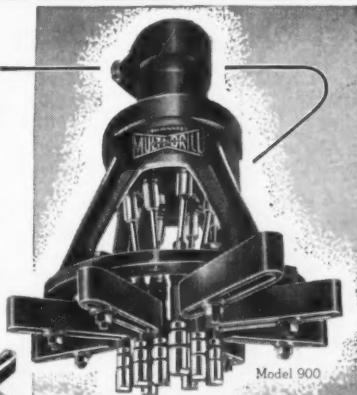
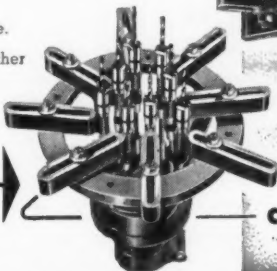
- Designed for accurate, high speed production drilling
- RUGGED CONSTRUCTION
- Quick, easy adjustments to **any** hole pattern on or within a 9" circle; $\frac{1}{2}$ " minimum center distances; Drill sizes $\frac{1}{16}$ " to $\frac{3}{8}$ "
- Special adaptations available.

MULTI-DRILLS are made in other sizes and models.

Write for details and name of your nearest Distributor.

• **Locator arms are designed for fast, easy adjustment**

Dependable Performance...
proven by industry



**FITS ANY
DRILL PRESS**

COMMANDER MFG. CO.

W. KINZIE STREET, CHICAGO 24, ILLINOIS

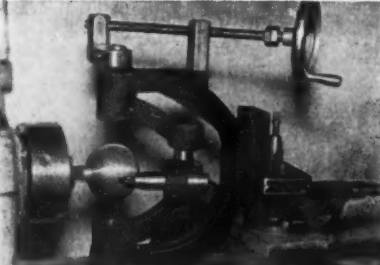
For more data circle 530 on Postpaid Card

new shop equipment . . .

**SCRAPER IS AVAILABLE
IN ELECTRIC AND
PNEUMATIC MODELS**

Borel and Dunner, 19313 Farmington Rd., Livonia, Mich., announces the Biax Power Scraper, electric and

New RADITURN ✓



CUTS ANY RADIUS
Convex, Concave or Ball
Patented

The accurate short cut for turning any radius.
Adaptable to most any lathe.
Contact your tool supplier or write for details.

RETCO MFG. & SALES
1458 E. CLINTON • FRANKFORT, IND.

For more data circle 531 on Postpaid Card



Biax Power Scraper is shown here in use

air operated models, that can be used for all scraping processes on sliding and locating surfaces. The adjustable stroke of the blade makes it possible to use the Biax for roughing and finish scraping.

Advantages of the Biax Power Scraper are its unlimited mobility and practical operation. Better quality of the finish surfaces—22 and more points per square inch, without the conventional figure scraping. Time savings up to 50 percent over hand scraping operation are said to be possible.

For more data circle 110 on Postpaid Card



SPELLMACO 'SPOTTERS'

**A matched set of transfer punches
for toolmakers, machinists and tool cribs**

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes $\frac{3}{32}$ " to $\frac{1}{2}$ ", by
 $\frac{1}{4}$ "—plus handy $\frac{17}{32}$ " size. Length $4\frac{1}{8}$ ". ONLY \$17.90.
Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

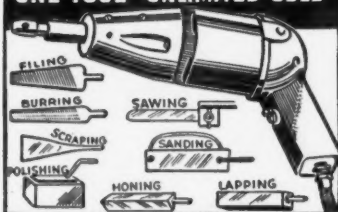
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B-R-E-A-K...

Hand Finishing Bottlenecks

**with Portable Electric
Reciprocating Tools**

ONE TOOL-UNLIMITED USES



These handy tools will cut out many tedious hand filing and finishing operations—Increase Production—Produce Uniform Work.

Light in weight—Delivers $\frac{1}{8}$ " or $\frac{3}{16}$ " fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.

ACME TOOL CORP.

73 WEST BROADWAY NEW YORK 7, N. Y.

For more data circle 533 on Postpaid Card

UNEQUALLED

For Small Jig Boring Jobs!

**LINLEY
JIG BORER**

Made for small precision work found in all sized shops. Meets your most exacting requirements; releases large capacity borers for heavier jobs. Investigate the savings made possible with the Linley Jig Borer. An inquiry card mailed today will bring you detailed information promptly.

Table Size: 7"x17½"
Table Travel: 6½"x10"



LINLEY BROTHERS CO.

661 State St. Ext., Bridgeport 1, Conn.

For more data circle 534 on Postpaid Card
March, 1959

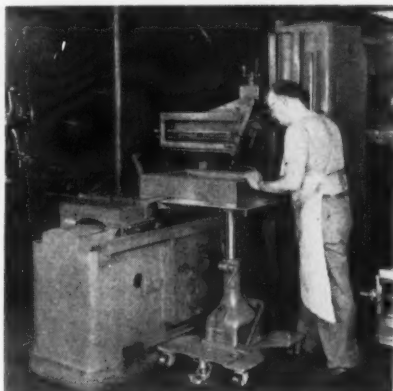
THE BEST

PORTABLE

ELEVATING TABLE

YOU CAN BUY...

(Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

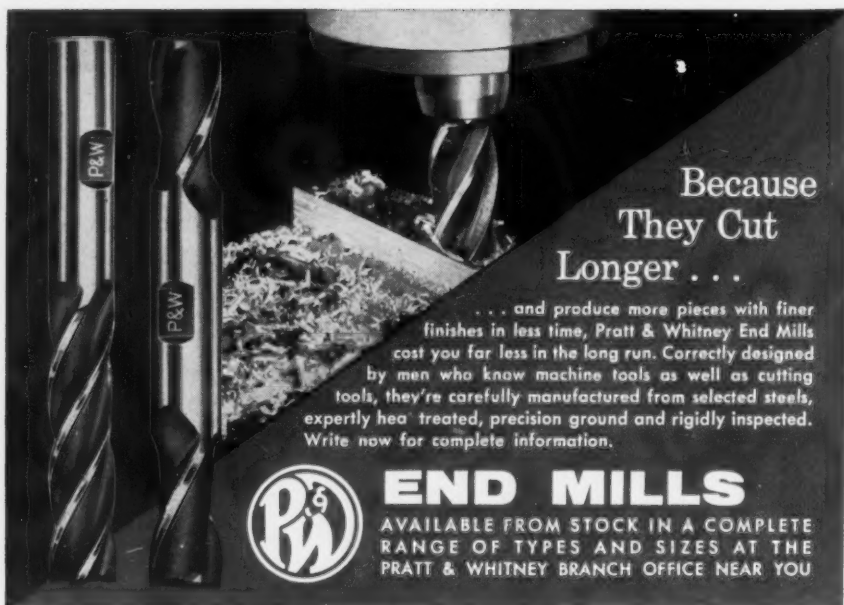
**A precision made
MIDWEST TABLE
Costs no more!**

- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
- ✓ Rigid cast construction
- ✓ Top turns 360° and clamps
- ✓ Foot release valve to lower
- ✓ Machined top surface can be used as work table.
- ✓ Roller bearing casters with ball bearing swivels
- ✓ Floor clamping available extra

Write today . . . specials on request

MIDWEST
TOOL & ENGINEERING COMPANY

114 WEBSTER ST. • DAYTON 2, OHIO
For more data circle 535 on Postpaid Card
modern machine shop 243




**Because
They Cut
Longer . . .**

. . . and produce more pieces with finer finishes in less time, Pratt & Whitney End Mills cost you far less in the long run. Correctly designed by men who know machine tools as well as cutting tools, they're carefully manufactured from selected steels, expertly heat treated, precision ground and rigidly inspected. Write now for complete information.

END MILLS

AVAILABLE FROM STOCK IN A COMPLETE RANGE OF TYPES AND SIZES AT THE PRATT & WHITNEY BRANCH OFFICE NEAR YOU



For more data circle 536 on Postpaid Card

new shop equipment . . .

HIGH PRODUCTION UNIVERSAL GRINDING MACHINE

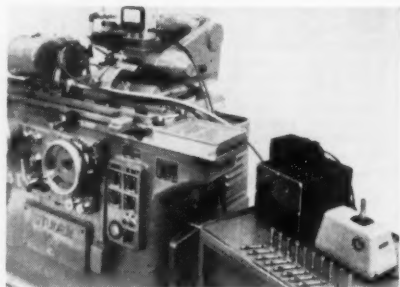
A high precision universal grinding machine, the Studer RHU-450, is available from Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Hydraulically controlled and equipped with special electronic measuring controls, the Studer RHU-450 is designed particularly as a production machine for match grinding, internal and external grinding, and superfine and lap grinding.

The electronic measuring controls include (1) a Movolimit electronic size control instrument for accurate grinding to a predetermined diameter from a master part or the first workpiece in the run; and (2) a Deltalimit match grinding instrument which has

been designed for match grinding a shaft to fit a specific bore diameter.

The Studer RHU-450 Grinder will grind workpieces up to 18 inches between centers with an 8 inch swing. Work spindle speed is infinitely variable from 30 to 650 revolutions per minute.

For more data circle 111 on Postpaid Card



The Studer RHU-450 Universal Grinder

TURBINE GRINDER

A single stage, high speed, turbine grinder, known as the "imp", Model 7979, is announced by The Aro Equipment Corp., Bryant, Ohio. It does any kind of grinding or cutting where $\frac{1}{8}$ inch shank mounted wheels or cutters can be used. It grinds, deburrs, cuts and polishes. It delivers 75,000 r.p.m. at normal 90 pound airline pressure.

The vanes of the single stage impeller allows a straight-through flow of pressurized air, so that exhaust air can be discharged at the spindle end of the tool. This air system blows chips and particles away from the work.

The twist type throttle delivers maximum air with slightly more than a quarter turn, and will also hold any desired setting below maximum speed. It is recommended that the grinder be installed with an airline filter only,



Aro Model 7979 "imp" Turbine Grinder
so that moisture may be removed from the air system.

Specifications of the turbine grinder include: motor, single stage impeller; weight, 7 ounces; overall length, $4\frac{1}{2}$ inches; spindle offset $\frac{9}{16}$ inch; air inlet $\frac{1}{8}$ inch female N.P.T.F.; collet size, $\frac{1}{8}$ inch.

For more data circle 112 on Postpaid Card

*In a RUSH
for Cutting
Tools & Gages?*

*Just call the number in
the city nearest you.*



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

For more data circle 537 on Postpaid Card

BIRMINGHAM TRemont 1-0482	DALLAS Fleetwood 2-1709	PITTSBURGH POplar 1-7212
BOSTON (Cambridge) Kirkland 7-5875	DETROIT Diamond 1-1070	PORTLAND, ORE. ATlantic 7-1867
BUFFALO (Tonawanda) UNiversity 8804	HOUSTON WAlnut 6-9643	ROCHESTER LUdlow 6-6212
CHARLOTTE EDison 2-7774	LOS ANGELES ANGelus 3-7506	ST. LOUIS CEntral 1-6770
CHICAGO HUmiboldt 9-1626	LIVINGSTON, N.J. WYman 2-5353	SAN FRANCISCO MArket 1-7363
CINCINNATI PArkway 1-3112	MILWAUKEE GLenview 3-7650	SEATTLE MAin 4-1141
CLEVELAND ORchard 1-7216	NEW YORK (Flushing) INdependence 1-6363	SYRACUSE HOward 3-8214
	PHILADELPHIA WAlnut 2-1140	WEST HARTFORD ADams 3-7561



LASTING ACCURACY...

at
Lower
Cost!

More accurate than hand-scraped metal plates, these black granite surface plates cost far less to purchase. Harder, smoother and much less subject to nicking, denting and other damage, they retain their original high accuracy for years without costly re-scraping or re-finishing. Available in 3 grades; Toolroom, Inspection and Laboratory. Write today. Ask for P&W Circular No. 621.



PRECISION Black Granite SURFACE PLATES

AVAILABLE FROM STOCK AT THE P&W BRANCH OFFICE NEAREST YOU.

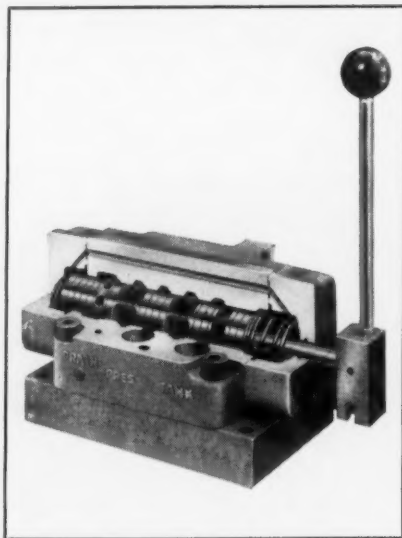
For more data circle 538 on Postpaid Card

new shop equipment . . .

HYDRAULIC VALVES

Rivett Inc., Brighton 35, Boston, Mass., introduces a line of 3,000 p.s.i. hydraulic valves, meeting all J.I.C. requirements. This high pressure valve fills a need for above average pressures in manufacturing processes where machinery has been automated.

Known as the Model 6100, the valve is sub-plate mounted and manually controlled by lever. It is available in five actions: (1) moved manually to either end position; (2) moved manually to "in" position and spring-offset to "out" position; (3) moved manually to "out" position and spring-offset to "in" position; (4) spring centered; and (5) ball detent where valve piston is held in either end position by detent. The valve has large unstrict-



Cross section view of hydraulic valve

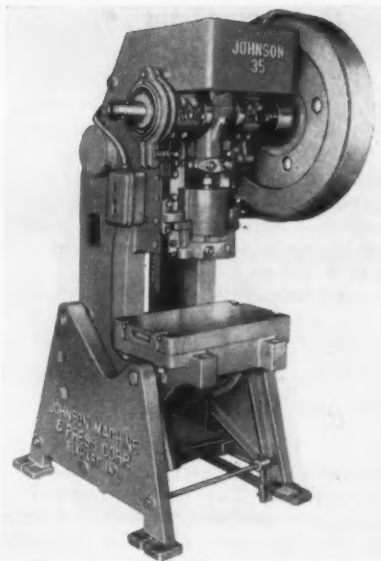
ed passages to allow greater flow capacity. For example, the 1 inch size is rated at 28.2 g.p.m. at 15 f.p.s. The piston has extra long sealing surfaces and the spool is shock resistant by metering the fluid with its scalloped design. The Rivett 6100 is available in seven basic spool designs and in sizes from 1/4 inch to 2 inches.

For more data circle 113 on Postpaid Card

★ modern machine shop ★

35 TON O.B.I. PRESS

Johnson Machine and Press Corp., 620 West Indiana Ave., Elkhart, Ind., announces a 35 ton open back inclinable press. This is a one piece, high tensile cast iron frame press. The "box top" is an integral part of the main frame casting, which greatly supports the crankshaft bearings and reduces harmful deflection. It is available in the conventional flywheel or



Johnson 35 Ton Open Back Inclinable Press

FREE! This NEW, Helpful Catalog of PRATT & WHITNEY Precision ROTARY TABLES

Describes the complete line of 16 models . . . including important developments like the Numerically Controlled Table, the super-precise Optical Table and the time-saving Automatic Indexing Table. Get the facts. See how you can bring new standards of speed, economy and precision to your jobs.

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Pratt & Whitney Co., Inc.,
25 Charter Oak Blvd.,
West Hartford,
Connecticut.

24"
POWER
ROTATED



TLTING ROTARY TABLE



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

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March, 1959

modern machine shop 247

new shop equipment . . .

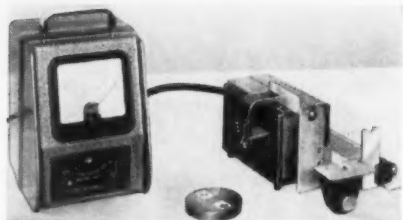
back geared styles, and comes equipped with either the Johnson pin clutch or the Wichita air friction clutch. The main bearing caps are split on a 30 degree angle, which allows the massive frame to absorb the shock load. Crank strokes range from the standard 2½ up to 6 inches.

For more data circle 114 on Postpaid Card

★ modern machine shop ★

SURFACE FINISH TESTER

Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill., announces the Talysurf Model 100, which is a portable, universal instrument, semi-automatic in its operation yet suited to a wide range of production inspection applications in the



Talysurf 100 Surface Measuring Instrument

precision testing of surface finish. Work tables, pick-up, stylus and support are combined with motorized drive in one solid assembly, which can carry small work in universal work-holding fixtures or be fitted with special quick loading type of production tooling.

The same unit, inverted, can be used to check either large flat or cylindrical work.

Quick acting lever starts the fast testing cycle which gives in separate



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, Ill.

For more data circle 540 on Postpaid Card

NESTING TYPE


TOTE PANS

20" x 12" x 6¼"
(16 Gauge)



J. L. LUCAS & SON, Inc.
BRIDGEPORT 5, CONNECTICUT

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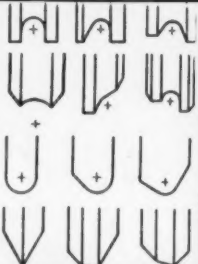
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WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

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REPRESENTATIVES WANTED
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JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.



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HELIOS PRECISION VERNIER CALIPERS

Guaranteed accuracy .001"

MODEL 50 DCS
dull chrome finish
on STAINLESS STEEL



SPECIAL OFFER

\$12.80 with Leather Case

● EASIER READING with double Vernier

● NO STRAIN FROM GLARE with dull chrome finish

Ask for literature on other Helios Calipers, Vernier and Dial, also Helios Parallels, Hole Gauges, Telescope Gauges, Radius Gauges.

KARL A. NEISE

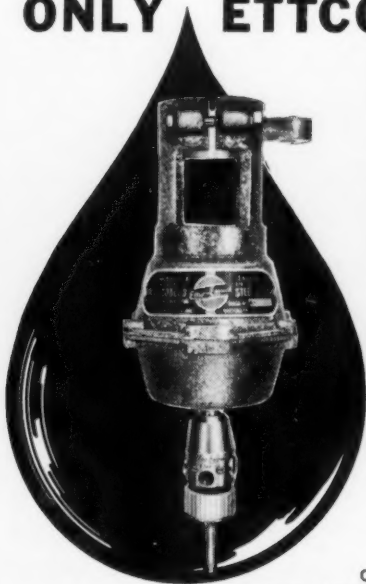
Dept. MM-39, 404 4th Ave.,
New York 16, N. Y.

NEISE
MODERN TOOLS



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ONLY ETTCO TAPPERS



run in oil

Ettco-Emrick

- Faster, more accurate tapping
- Smoother running
- Longer lasting
- Much more sensitive

There's a low cost Ettco Tapping Attachment for every small hole job. Write for information.

— Buy them from your authorized Ettco distributor.

ETTCO TOOL & MACHINE CO., INC.

598 Johnson Avenue, Brooklyn 37, N. Y.

Chicago • Detroit • Los Angeles • Indianapolis • Hartford

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March, 1959

modern machine shop 249



SEE YOUR CAPEWELL DISTRIBUTOR

for
hand hack saws
power hack saws
hole saws
band saws
hammers
ground flat stock
and for quick
dependable service
on all your
industrial needs



THE CAPEWELL MFG. CO.
HARTFORD 3, CONN.

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250 modern machine shop

new shop equipment . . .

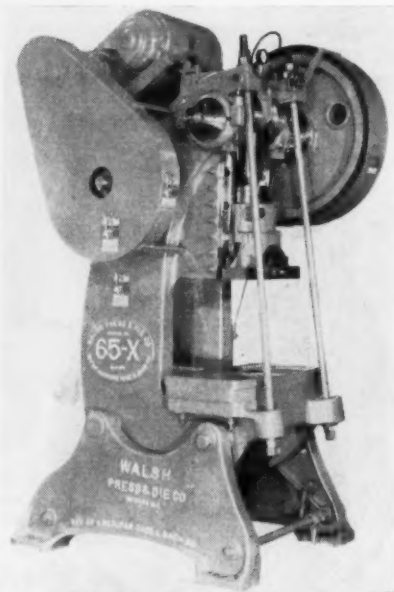
meter unit correct unwavering average readings in one stylus traverse. Tallysurf Model 100 provides the same positive surface finish values in arithmetical average microinches as does the master unit Tallysurf Model 3. For more data circle 115 on Postpaid Card

★ modern machine shop ★

DEEP THROAT O.B.I. PRESS

Walsh Press and Die Co., 4709 West Kinzie St., Chicago 44, Ill., announces the No. 65X Walsh 65 ton deep throat open back inclinable press. It can be furnished in flywheel and back gear models with strokes up to and including 7 inches.

Features include: die forged alloy tool steel balanced and precision



No. 65X Walsh 65 Ton O.B.I. Punch Press

March, 1959

ground crankshafts, high tensile strength frames, large flange slide and ruggedness where needed in the design of the press frame and other component parts.

For more data circle 116 on Postpaid Card

★ modern machine shop ★

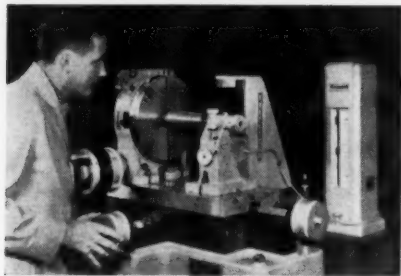
CAM MEASURING MACHINE

A Precisionaire Measuring Machine for inspecting the contour of two and three dimension cams is available from The Sheffield Corp., Dept. 12, Dayton 1, Ohio. Three dimension cams up to a 3 inch radius and 6 inches long can be inspected on the measuring machine, which uses bench space of 32 by 26 inches. Irregular shaped parts, requiring precise measurement, can be inspected also.

Features include: the high amplification Precisionaire fiducial indicator for locating cam datum points precisely; the 4 inch barrel micrometers accurate to 0.000010 for setting radial and axial movements; ultra-precise rotary table to establish the angular coordinate of the cam; longitudinal slide mounted on free-moving balls.

Radial and axial movements can be made to an accuracy of 0.00001 and angular position to within plus or minus 6 seconds of arc throughout the entire 360 degrees.

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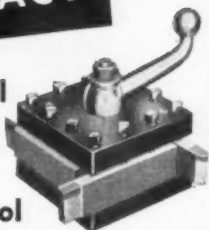


Sheffield Precisionaire Measuring Machine

March, 1959

**±.0005"
ACCURACY**

Here's Real
Precision
Plus
Multiple Tool
Efficiency



ENCO TOOL POST TURRETS

Boost lathe production, cut costs, reduce tool switching and re-checking, cut set-up time, with ENCO 12-station tool post turret! Holds 4 maximum size tools . . . 3 working positions each. Sturdy and rigid for hogging cuts, yet unsurpassed for close-tolerance work.

ON-THE-BALL

RE-INDEXING

Spring loaded balls locked between perfectly milled spherical seats provide consistent re-indexing accuracy. "On the ball" every time!

There's an ENCO turret for every lathe.

Mail coupon for cat. #53 and name of nearest ENCO Franchise Dealer.

ENCO Mfg. Co.
4520 W. Fullerton
Chicago 39

ENCO Manufacturing Co.
4520 W. Fullerton,
Chicago 39. Dept. 139

Please send catalog #53 and full details of
ENCO 12-station tool post turrets.

Name

Firm

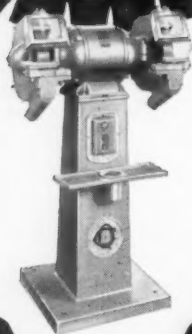
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30 DAY FREE TRIAL



- BENCH
- PEDESTAL

Queen City HEAVY DUTY

- GRINDERS • DISC GRINDERS and BUFFERS

We know what goes into these Grinders and Buffers! That's why we can make this offer.

Point for point—you just can't beat QUEEN CITY Heavy Duty Disc Grinders and Buffers. Built to stand up under hardest use . . . heavy duty motors deliver full horsepower. Wheels, guards, switches, cords, eyeshields are of highest quality . . . selected to deliver long, trouble-free service.

Choose from a complete line of floor or bench types . . . in sizes from $\frac{1}{2}$ to 10 H.P. and buy them for 20 to 30% under competing makes. Try them for 30 days on money-back guarantee!

**QUEEN CITY
MACHINE TOOL CO.**

write for
FREE CATALOG
TODAY!

3911 KELLOGG AVE.
Cincinnati 26, Ohio

"Known for Quality for Over 50 Years"

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252 modern machine shop

new shop equipment . . .

GAGE BLOCKS

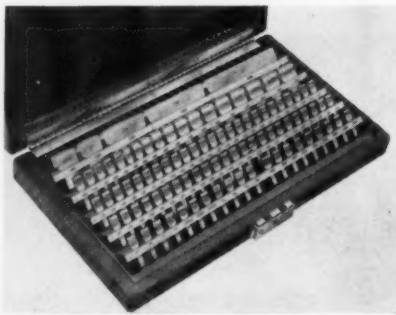
A complete change in the line of Webber Rectangular Steel Gage Blocks to incorporate higher accuracies and reduced prices is announced by Webber Gage Co., 12899 Triskett Rd., Cleveland 11, Ohio.

Rectangular steel blocks formerly classified as Grade A, with accuracies of plus 0.000004 inch and minus 0.000002 inch are now called A+.

In addition, an entirely new classification of Webber Rectangular Steel Gage Blocks has been created, featuring plus or minus 0.000002 inch accuracies. They are known as Grade AA. The former Grade B line, with plus 0.000006 inch and minus 0.00002 inch accuracies, has been discontinued. The manufacturer states that the new Webber classifications have been called A+ and AA because their accuracies exceed those specified by the U. S. Bureau of Standards for Grade A blocks.

According to the manufacturer, this upgrading of the complete line of Webber Rectangular Steel Blocks has been made possible by new, high-efficiency equipment designed and built by Webber.

For more data circle 118 on Postpaid Card



Webber Rectangular Steel Gage Blocks

March, 1959

3 INCH RANGE INDICATOR

Federal Products Corp., 9141 Eddy St., Providence 1, R. I., announces that extra long measuring range is available with the Model E8IU Dial Indicator.

Specially designed for use in measuring slide travel, cam throw and so on, this model has a total range of 3 inches and is graduated in 0.001 inch. To enable quick reading anywhere in the total span of 30 revolutions, the Model E8IU is equipped with two counter dials. One is divided into ten segments of 0.100 inch each to count individual revolutions. The other one is divided into inches.



The Federal Model E8IU Dial Indicator, which is shown above, has a 3 inch range

Construction of the E8IU is similar to that of regular Federal indicators, except for increased length of stem, spindle and dust cap to allow for greater distance of spindle travel. Model E8IU has a full jeweled, low friction movement and adjustable bezel.

It is furnished with a vertical central bracket back and continuous clockwise dial.

For more data circle 119 on Postpaid Card



MARSHALL STEEL COMPANY

Box 108-M, LaGrange, Illinois

FREE WALL CHART

Write for: Complete Free Wall Chart showing sizes and grades of Ground Flat Stock, Drill Rod and Alloy Steel.

MARSHALL PRECISION Ground Flat Stock

3 KINDS

Oil-tempered • Air-hardening • Shock-resistant

READY FOR LAYOUT BECH

SPECIAL SIZES FURNISHED ON REQUEST—SPECIFY MARSHALL PREPARED TOOL STEEL

...IMMEDIATE DELIVERY—2000 SHIPMENTS DAILY FROM STOCK...

MARSHALL STEEL COMPANY

COMPETITION

BRINGS OUT THE BEST IN EVERY COMPANY

MARSHALL STEEL COMPANY specializes in the production of Ground flat tool steel, Drill Rod and allied products. Since 1945 Marshall Steel Co., has grown to FIRST PLACE in the production of velvet finish ground flat tool steel.

DID YOU KNOW THAT...

Marshall was **FIRST** to produce wide sizes.

FIRST to produce thicknesses over 1/2 inch.

FIRST to offer long lengths from stock for economy.

FIRST to furnish 5% chrome Air Hardening steel in finished ground form.

FIRST to supply 5% chrome Air-Harden Hardening tool steel in both 18" and 36" lengths.

FIRST to manufacture LOW CARBON 1018 steel for applications not requiring hardening.

FIRST to safety wrap in Aluminum lined rustproof wrappings.

LEADERSHIP—often copied—never equaled!

This is why—Marshall Steel Company has grown to be the largest producer of Ground Flat Tool Steel.

FOR YOUR CONVENIENCE write for colorful wall chart with all sizes and grades. We invite comparison—write for complete catalog of products.

Emblem of Excellence

For more data circle 548 on Postpaid Card

new shop equipment . . .

GRANITE SURFACE PLATES

Pratt and Whitney Co., Inc., 25 Charter Oak Blvd., West Hartford, Conn., announces a line of precision granite surface plates and accessory equipment. The granite products range from small toolmakers' flats to large 7 by 14 foot surface plates and include accessory items such as: granite lay-out, angle and T-slotted plates, parallels and straightedges. Surface plate stands, with either leveling screws or casters, can be furnished. These plates are excellent for precision checking of parts, instruments and assemblies, for laying out designs and for engineering work.

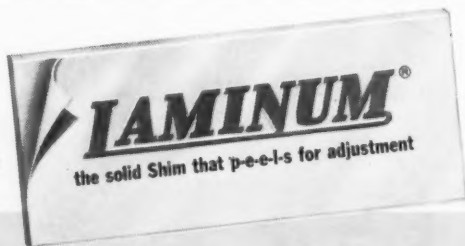
The granite plates and accessories are composed of California black granite that has been normalized and stress-relieved by nature through



P & W Precision Granite Surface Plates

many centuries, and are said to hold accuracy permanently with practically no maintenance. They repel moisture, shed abrasives, resist erosion, will not warp and are washable with soap and water. They are relatively unresponsive to temperature changes and are non-magnetic. Gage dials are easy to

Exclusive Feature!
NO TIME LOST WITH...



Laminated Shims of *Laminum* are so much more than "just shims." They're custom-made...to your own exacting requirements, including rigid Aircraft specifications...with laminations so completely bonded that they look and act like solid metal...yet simply p-e-e-l to a thousandth fit right at the job. No time lost! No machining! No grinding! No stacking! No counting! No miking! No dirt between layers—ever!

Send for
free copy
"Engineering
Data File"

BRASS
with
laminations
.002"
.003"

**MILD
STEEL**
with
laminations
.002"
.003"

**STAINLESS
STEEL**
with
laminations
.002"
.003"

ALUMINUM
with
laminations
of .003"
or
NEW .002"

THE LAMINATED SHIM COMPANY, INC. Coast-to-coast Service in Aircraft
For more data circle 549 on Postpaid Card

Quali

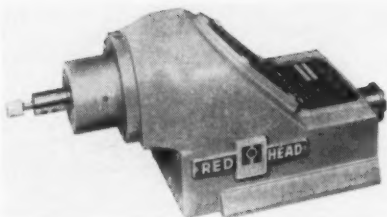
read against the non-reflecting black of the plates, even in bright light.
For more data circle 120 on Postpaid Card

★ modern machine shop ★

BELT DRIVEN WHEELHEAD

Grinding small holes at precise surface speeds without high frequency generating equipment is possible with belt driven wheelheads, developed by The Heald Machine Co., Worcester 6, Mass. Interchangeable cartridge type wheelheads develop spindle speeds of 45,000 to 100,000 r.p.m. for grinding small diameter holes where surface speed of the grinding wheel is critical.

Two cartridges are available. One operates at speeds of 45,000, 52,000 and 60,000 r.p.m., the other at 70,000, 85,000 and 100,000 r.p.m. The three separate speeds for each cartridge are obtained by pulley change. Both cart-



Heald High Speed Belt Driven Wheelhead

ridges have spindles arranged to accommodate mounted point wheels. Ease of cartridge interchange and simplicity of changing from one speed to another within the range of each cartridge, make the application of high speed belt driven wheelheads excellent where frequent setup changeovers are necessary. The wheelheads are suited for long production runs.

The basic wheelhead consists of a jackshaft and body unit and the

Exclusive Feature! BETTER SERVICE ON...



Here's why...we've been specializing on both Laminated Shims and Stampings since 1913. Consequently we have our own special skills, tools and equipment—most of them unknown to competition—to produce Precision Stampings...standard or special...one or a million...faster, and at the lowest possible cost. Let us quote your next Stampings job...brazing, welding and assemblies, too!

Any one of these 3 METHODS

will economically produce Aircraft Quality Stampings—"one or a million"—to your detailed specifications:

1. MACHINE CUT METHOD for just a few pieces—at experimental or pilot stage. No dies needed. Special techniques and equipment keep costs down.

2. SHORT RUN METHOD. Use of low cost, short run tooling, plus special equipment produces more than "just a few." Quality stays high—and costs stay low.

3. PRODUCTION RUN METHOD. Here is where our special tooling applies to great advantage. When dies are needed, charges are moderate. Fast delivery at lowest possible cost.

Send for free booklet—"Service in Stampings"

Quality Shims and Stampings • 3303 UNION STREET, GLENBROOK, CONN.

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new shop equipment . . .

spindle cartridge. A spring loaded damped idler puts constant tension on the spindle drive belt; its design eliminates vibrations caused by idler bounce associated with conventional idlers. The grinding spindle is oil mist lubricated.

For more data circle 121 on Postpaid Card

POWER PRESSES

A line of power presses, with pneumatic friction clutch and brake, has been designed by Famco Machine Co., 3122 Sheridan Rd., Kenosha 2, Wis. Ranging in sizes from 6 to 18 tons in bench or floor models, this power press line offers greater production, lower maintenance and low initial cost. The clutch and brake are said to offer rated

capacity at up to 40 percent less cost. It is a high torque, low inertia unit, is self-compensating for wear and never requires any adjustment. The air brake enables continuous stroking without fear of overheating. The clutch disengagement point in the stroke is conveniently adjustable to provide for varying requirements and die weights encountered on different jobs.

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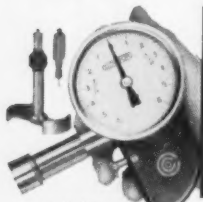
Are you asking him to control a precision machine without a precision gage?



Give him
**COMPLETE
KNOWLEDGE!**

1. exact size shown readable to fraction of .0001". (a fixed — not passing reading.)
2. front or back taper, exact amount of.
3. ovality, exact amount of diameter variation.
4. bell mouth or barrel shape, exact amount of lateral irregularity.

Self-centering and self-aligning Comtorplug assures precise gaging, easily and simply, independent of operator variations. For holes from $\frac{1}{8}$ " to 10" diameter.



For holes
 $\frac{1}{8}$ " to 10" diameter

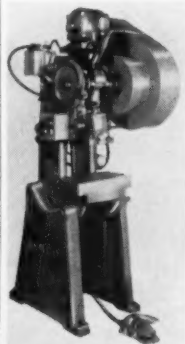
COMTORPLUG USERS INCLUDE

Airesearch Mfg. Co.	Fairchild Engine & Airplane Co.	Lycam, Spencer Div.
Allison Div.	Falk Corp.	McDonnell Aircraft
Buick Motor Div.	Ford Motor Co.	National Lead
Century Electric Co.	General Electric Co.	Northrop Aircraft
Chicago Press Tool	Hamilton Standard Division	Pontiac Motor Div.
Chrysler Corp.	Harris Seybold Co.	Scintilla Magneto
Continental Motors	Homelite Corp.	Steel Products Eng.
Curtiss-Wright	Int. Harvester Co.	Studebaker-Packard
Dana Corporation	Jacobs Mfg.	Sylvania (Atomic Div.)
Detroit Transmission		United Airlines
Douglas Aircraft		Warner Gear Div.

SEND FOR BULLETIN 50 →
COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

COMTORPLUG

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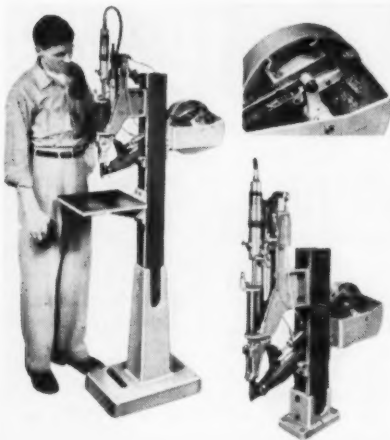
Famco Power Press

DRIVER FOR SCREWS AND NUTS

An improved driver for screws and nuts, called the Auto-Torque Driver, is announced by Dixon Automatic Tool, Inc., 2314 Twenty-Third Ave., Rockford, Ill. It consists of the parts positioner head, a compact air-motor drive for the spindle and a parts feeder, which requires no auxiliary motor or vibrator. It is equipped with a built-in sensing mechanism and an adjustable-torque clutch, which is accurate within 5 percent of the torque setting. Minimum cycle time is only 6/10 seconds, depending upon the threaded distance.

The Auto-Torque Driver can be furnished with floor mount and foot treadle to initiate the cycle, or as a completely automatic station with electrical connections and solenoid valve to automatically initiate the cycle. Since the head is only 3 1/4 inches wide, very close nesting in multiple applications is possible.

For more data circle 123 on Postpaid Card



(Left) Dixon Auto-Torque Driver which is air operated, with foot pedal to initiate the cycle. (Right) Model SD-101 with electrical controls to operate the driver as a fully automatic station. (Top) Feeder drum and bowl.

March, 1959

Universal "FULL-FLO" COOLANT NOZZLES with AERATOR

Ask for IPB-Sec. 2A Bulletin



Quality... ALL METAL FLEXIBLE HOSE PRODUCTS

UNIVERSAL METAL HOSE CO.

2113 South Kedzie Avenue, Chicago 23, Illinois

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CAM MILLING JIG BORING



A SPECIALIZED CAM
MILLING SERVICE.
JIG BORING

... SPOT WELDING
... CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO. 33-C

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 553 on Postpaid Card

How to ENGRAVE PANELS and SIGNS to 30" WIDE by any length

Use the LOW COST precision built
Preis-Panto 2D-4 Engraving
Machine. It does the work of larger
machines, costing much more.



- Pantograph is graduated with reductions from 1:1 to 100:1 and will reduce to any size to infinity.
- Pantograph and spindle link joints equipped with precision ball bearings throughout.
- Precision ball bearing cutter spindle.
- Collet capacity from 1/10" to 1/4" and standard taper shank cutters.
- Six spindle speeds—5,000 to 14,000 rpm.
- All feed-screw dials graduated in .001".

TRADE MARK



Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS ENGRAVING MACHINE CO.
657 U.S. Route 22, Hillside, N. J.

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modern machine shop 257

new shop equipment . . .

KNURLING TOOL ELIMINATES DISCARDING WORN CASTINGS

A knurling tool, which effectively and economically rehabilitates worn castings by raising the metal in the bore, is announced by Peerless Tool Co., 4621 North LeClaire Ave., Chicago, Ill. This Peerless I.D. Knurling

Tool eliminates the costly necessity of discarding worn castings. By raising the metal in the bore through knurling, the tool makes possible better, longer lasting fitting of bearings and parts in such cylinders as transmission housings, generator end plates, differential housings, air compressor housings, transfer cases, power dividers, wheel hubs, speed reducers, fluid couplings, torque converters and many others. The tool replaces the expensive

and often inefficient "sleeving" or welding method of rehabilitating the worn "out of shape" bore of housings and workpieces.

The manufacturer states that pressure tests have proved that worn housing bores which have been raised and rehabilitated with the Peerless Knurling Tool have attained as much as 93 percent gripping power. The knurled bore is often even more durable than the original bore surface because the intermittent air spaces, resulting from the knurling oper-



FOR LESS THAN \$50 YOU GET 12 SETS, EACH SET GROUND READY TO GO

Men would not accept

EITHER IDEA AT FIRST . . .

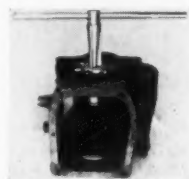
INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than \$50 you get a dozen sets of $\frac{3}{4}$ —16 insert chasers, each ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest"

THE EASTERN MACHINE SCREW CORPORATION

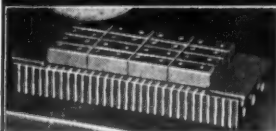
40-50 Barclay Street, New Haven, Conn.

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Peerless Knurling Tool

SPEED SURFACE GRINDING SET-UPS WITH



- Grind Work Square
- Grind Work Parallel
- Hold Round Pieces

MAGNE-BLOX LAMINATED PARALLELS AND V-BLOCKS

Save Your Magnetic Chucks
Eliminate Clamps
Eliminate Holding Devices

**UNIVERSAL SET
IN CASE**

\$27⁵⁰



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ILLUSTRATED FOLDER**

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WEST COAST BRANCH: SCHERR-TOMICO CO. - 3337 W. Olympic Blvd. - Los Angeles 19, Cal.
200 MM LAFAYETTE STREET • NEW YORK 12, N. Y.

For more data circle 556 on Postpaid Card

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it". Simple to operate.



COMPLETE
LEAD HAMMER
SERVICE

*Write
for circular
and prices*

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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READING BENCH KEYSEATER

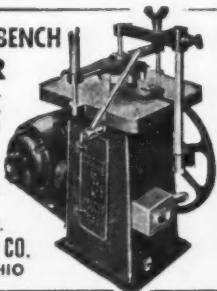
Portable — move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

**READING MACHINE CO.
CINCINNATI 37, OHIO**



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free!

**NEW 1959
CATALOG**

MONTGOMERY TOOLS

**92
TIME SAVERS
FOR TOOL MAKERS**

**MONTGOMERY & CO., INC.
411 Morris Avenue
Springfield, N.J. DRexel 6-4767**

Drill Press Tooling

Adjustable short-run drill jig
Self-centering air vise
Combination tapping/deburring tool

Lathe Tooling

Ball-turning tool for concave and convex radii
Quick-change tool holders for turret work on standard lathes

Surface Grinder Tooling

Jaws for holding non-magnetic material on magnetic chucks

Milling Machine Tooling

Vise with automatically contouring jaws for any odd shape work

Inspection Tools

Thread Triangles for simplified measuring of pitch diameter

Plus many more cost-cutting tools for toolroom, and production line

**Write for
your free copy.**


For more data circle 559 on Postpaid Card

new shop equipment . . .

ation, dissipates the generation of heat caused by the action of the bearing in the housing bore. With this reduction of heat, the surface of the bore is subject to considerably less friction and wear.

The Peerless I.D. Knurling Tool is

HOLES



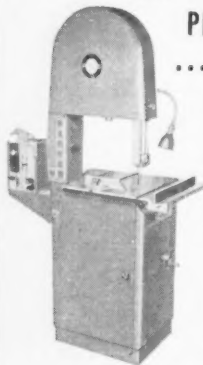
ECONOMICAL
FAST DRILLING
IN DEEP HOLES

Clark "SPADE DRILL"

P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 560 on Postpaid Card

The Universal Cutting Machine
PARKS M-2 18" Band Saw
Cuts METALS - ALLOYS
PLASTICS - WOOD
...and it costs
less than \$500!



Here is a rugged, precision-built machine that will cut any materials you work... at the speed best suited for that material—from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial saws.

The PARKS Woodworking Machine Co.
1511 KNOWLTON ST., CINCINNATI 23, OHIO
Manufacturers of Quality Machines Since 1887

For more data circle 561 on Postpaid Card

260 modern machine shop

a convenient portable size, permitting its use in the field or on the road, as well as in the shop. Very easy to use, the tool provides guides to fit all diameter bores up to 12 inches.

For more data circle 124 on Postpaid Card

★ modern machine shop ★

SELF-OPENING DIE HEADS

Geometric "KDI" Die Heads are announced by Geometric-Horton, New Haven 15, Conn. They can be converted from either outside trip to inside trip by a few minor adjustments. Inside trip is desirable on jobs requiring an accurate length of thread from the end of the workpiece. The company claims this feature makes it possible to cut accurate length threads, regardless of the chucking or location of workpieces, as the inside trip will always reference from the end of the workpiece.

On the larger sizes of these die heads, it is possible to provide reaming and chamfering tools attached to the end of the inside trip. The die head can be closed by an operating yoke in the groove in the tripping flange. Provision can be made to pass the coolant through the shank of the die head, if desired.

Conversion to outside trip is made

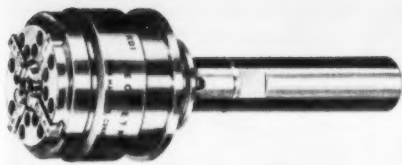
GRIND THE
*Eastern Centerless
Way*

WE SPECIALIZE
20 CENTERLESS GRINDERS
ESTABLISHED 1939

Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

For more data circle 562 on Postpaid Card

March, 1959



Geometric "KDI" Self-Opening Die Head

by a simple adjustment or by removing the inside trip completely, thus making conversion into the conventional sleeve operated die head.

The Geometric "KDI" Die Head is available in seven sizes from 5/16 inch to 2 1/2 inches.

For more data circle 125 on Postpaid Card

★ modern machine shop ★

FAST TURRET LATHE FOR SMALL PARTS

A small turret lathe, offering fast and accurate machining of various types of small parts, is announced by The Challenge Machinery Co., Grand Haven, Michigan.

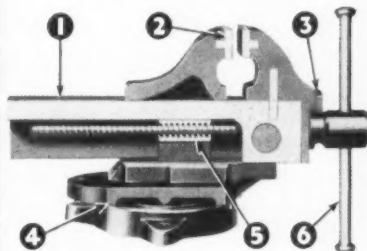
Special features of the machine are the rapid indexing control, which enables the operator to return the turret to the starting position, regardless of the number of operations performed, simply by lowering the control handle—an important timesaver particularly when only two or three operations are to be performed.

Another feature of the lathe is a steady rest, which permits accurate centering of parts to be machined. Holding of parts accurate to within 0.0005 inch is possible with this unit. The steady rest also opens and closes automatically at the start of the cutting cycle.

This Challenge 625 Precision Turret Lathe has a maximum collet capacity of 0.625 inch. It has a range of six speeds forward and reverse with speeds available from 720 to 2,640

VICE FEATURES

1. exclusive steel slide milled from solid bar
2. replaceable jaw inserts held by top-entering pins
3. outside screw retainer



4. positive locking 360° swivel base
5. longest wearing alloy steel nut
6. one-piece non-pinch handle

SOLID STEEL SLIDE

Simplex industrial vises give you the advantage of solid steel slides, jaws, nuts for maximum strength and ruggedness long after their modest cost is written off. Line includes milling machine, pipe, sheet metal and other models.

Desmond Simplex

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

For more data circle 563 on Postpaid Card

modern machine shop 261

DIXIE
tools
last up
to 75
times
longer



Dixie "Micro-finish" gives 10 to 20 times longer cutting life than ordinary tools and often as much as 75 times longer cutting usefulness. Dixie's grinding methods tend to eliminate fracturing and chipping of the cutting edges as ordinary machine grinding does. The chipping and flaking of the cutting tool is virtually eliminated. This provides a longer lasting cutting edge, that reduces tool wear and does a smoother job in the finished surface.

Dixie Micro-finish carbide tools cut faster and last longer, saving you both time and money. Dixie can also regrind your worn out, damaged or discarded tools with the same "Micro-finish" as on new tools.

Write Dixie today on your cutting tool requirements.

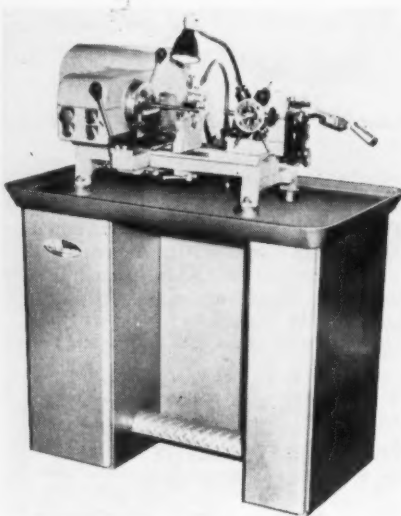
DIXIE TOOL INDUSTRIES

455 W. Franklin Ave.
 BRIDGEPORT, MICHIGAN

For more data circle 564 on Postpaid Card

262 modern machine shop

new shop equipment . . .



Challenge 625 Small, Fast Turret Lathe

r.p.m. with one motor and 1,128 r.p.m. to 5,275 with another. Rapid control of speed changes is provided by Hi, Low, Reverse and Stop pushbuttons, conveniently located on the front of the machine.

For more data circle 126 on Postpaid Card

★ modern machine shop ★

**INTERNAL GRINDER
 DESIGNED FOR
 MINIATURE BEARINGS**

The Bryant Chucking Grinder Co., Springfield, Vt., announces the Bryant Miniature Centalign Model B Internal Grinder, built specifically for grinding bores in miniature bearing races and internal ball tracks in miniature bearing outer races. The machine is of extremely compact design, requiring only 8¼ square feet of floor space.

March, 1959



Bryant Miniature Centalign Internal Grinder

Workpieces are automatically loaded, ground and unloaded by means of the Bryant disc drive shoe centerless fixture. This feature provides interchangeable "packaged tooling," which can be set up away from the machine, if desired. This allows almost uninterrupted machine operation and eliminates the need for long periods of downtime required to retool for work-part changes.

A complete range of bores and raceways in miniature bearing races up to 0.625 o.d. can be ground by means of the disc drive shoe centerless fixture.

For more data circle 127 on Postpaid Card

★ modern machine shop ★

UTILITY OVENS

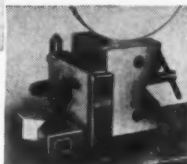
Blue M Electric Co., 138th and Chatham St., Blue Island, Illinois, announces its Test-All Series of mechanical convection ovens. Using a motor driven turbo blower, the

March, 1959

LASSY MASTER V-BLOCK ANGLE PLATES



HARDENED STEEL
New design saves hours of setup time. Assures precise work accuracy to .0001.



Also ideal as a master for regrounding worn or inaccurate angleplates.

Write for New illustrated catalog on Time Saving Devices

LASSY TOOL CO.
PLAINVILLE, CONNECTICUT

For more data circle 565 on Postpaid Card



**DECIMAL
REAMERS
and
Counterbores**

Selections by the THOUSANDS
STYLES • DIMENSIONS
RANGES • SELECTABILITY
STOCK ITEMS • NET PRICES
WHY BUY SPECIALS?

Send for this catalog NOW!

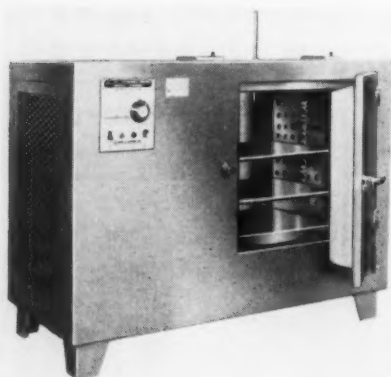


TWENTIETH CENTURY MFG. CO.
Box 429-M
LIBERTYVILLE, ILLINOIS

For more data circle 566 on Postpaid Card

modern machine shop 263

new shop equipment . . .



Blue M Test-All Series Utility Oven

heated air is propelled horizontally through a definite air flow pattern, thus insuring superior, constant and

uniform temperatures. The Mechanical Convection Method combines symmetrical heating and controlled velocity to provide excellent and economical temperature control.

These ovens will provide new heating efficiency for analytical and general laboratory work. They are ideal for preheating, aging, sterilizing, dehydrating, drying, baking in the food, rubber, steel industries, electronic field research and medical laboratories.

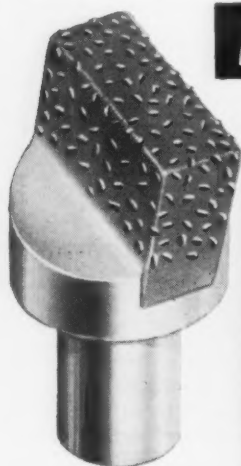
Ten bench models are available from 1.5 to 24 cu. ft. capacity, in addition to ten equivalent standard floor models.

For more data circle 128 on Postpaid Card

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SAFETY GLASSES

Bausch and Lomb Optical Co., 893 St. Paul St., Rochester, N. Y., an-



Any and Every

DIAMOND TOOL...

- ◆ Single-pointed diamond wheel dressers
- ◆ Cluster-type diamond wheel dressers
- ◆ Diamond-impregnated wheel dressers
- ◆ Thread grinding tools
- ◆ Special-shaped diamond tools for turning and boring
- ◆ Diamond tools for radius dressing and radius forming
- ◆ Also outstanding selection of diamond wheels and hones



**Latest Clipper
Diamond Catalog
CW 58
gives the details.
Sent on request.**

Clipper Diamond Tool Co.

345 HUDSON STREET, NEW YORK 14, N. Y. • CHelsea 2-7143

For more data circle 567 on Postpaid Card



Bausch and Lomb C-20 Safety Glasses

nounces C-20 Safety Glasses, designed to meet today's industrial needs. They are specially designed to combine long wearing comfort and functional good looks with the protection of safety glasses. It is a combination plastic and metal frame, with top rims and temples in dark brown, contrasting with white metal eyewires and engraved bridge.

A strong, durable front of nickel-silver completely encircles the lenses, assuring maximum frontal protection. The plastic and metal has been designed so that there is nothing to break, shrink or warp. The frame features a

sturdy bridge construction of extra strength firmly united to the eyewires by wide solder joints.

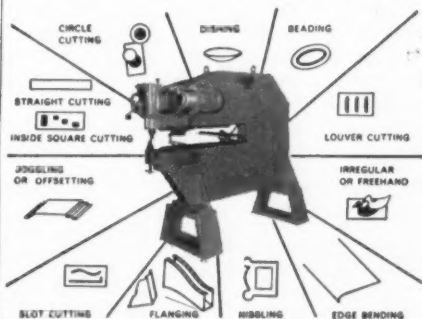
The glasses have high quality Bal-Safe lenses, heat treated for finest impact protection. Modern lens shape provides a wide field of vision and will accommodate any individual prescription, single vision or bifocal.

For more data circle 129 on Postpaid Card

A COMPLETE SHEET METAL SHOP IN ONE MACHINE

PULLMAX

DOES ALL OF THESE OPERATIONS

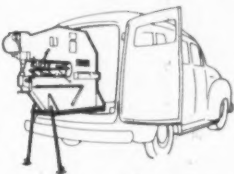


★ CUTS MILD STEEL UP TO 11/32"

The one machine that's sure to save time, labor and material when you work sheet or plate. Eliminates expensive die costs—easy to operate. 7 sizes to choose from.

Write for free catalog on Metalworking Ideas.

... 16 m.m. sound film
... or a demonstration right in your plant.



HOLES



HIGH-PRODUCTION
CLOSE TOLERANCE IN ONE PASS

Clark "HOLE MILLS"
P. O. BOX 990 BEVERLY HILLS, CALIF.

For more data circle 568 on Postpaid Card
March, 1959

AMERICAN PULLMAX CO., INC.

2465 N. Sheffield Ave., Chicago 14, Ill.

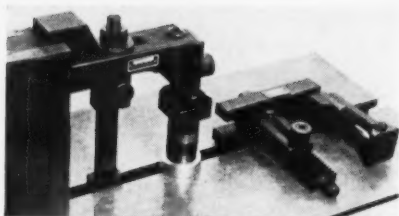
Visit us in Booth 200, Welding Show, Chicago, Apr. 7-9
For more data circle 569 on Postpaid Card
modern machine shop 265

new shop equipment . . .

CLAMPING SYSTEM STARTER SET

To introduce toolrooms, job shops and low-production machine shops to the advantages of the Hi-Lo Clamping System, Hi-Lo Products Co., 8823 Lyndon Ave., Detroit 38, Mich., has available a Starter Set. It contains all the parts needed to make up a clamp to suit any clamping range from $\frac{3}{8}$ inch to 11 inches. The set includes U-clamps in two adjustable ranges, extensions and a gooseneck adaptor. Both the bolt and the heel-block assemblies are adjustable.

Either range U-clamp can be used by itself, with extensions or with the gooseneck adaptor. With the T-nut on the bolt, this clamp can be used on slotted tables. Without the T-nut, the bolt can be screwed directly into bolsters. Adjustment is simple. A slot-



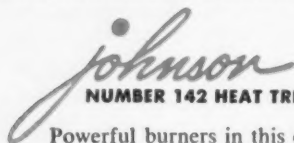
The Hi-Lo Clamping System Starter Set

and-shoulder arrangement permits serrations to be disengaged with just a quarter turn of a knurled knob. Parts stay integral and, after being adjusted to height, lock with a quarter turn of the knob. Extensions for the heel block snap together and extensions for the bolt screw together.

Hi-Lo Clamps are also available in complete sets in sizes to meet normal needs for use on milling machines and boring machines.

For more data circle 130 on Postpaid Card

HEATS FAST SAVES TIME

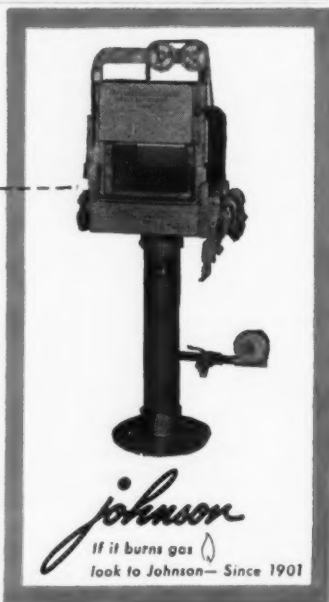


NUMBER 142 HEAT TREATING FURNACE

Powerful burners in this efficient furnace get heat up to the 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Does fast job with high speed and carbon steels. Ratchet-operated door opens upward. High temperature, refractory-lined firebox is 7" by 13" by 16½". 200,000 BTUs per hour. Carbofrax hearth, G.E. Motor and Johnson Blower included, F.O.B. Factory \$358.00
Write today for free Johnson Catalog

JOHNSON GAS APPLIANCE COMPANY
571 E Avenue NW, Cedar Rapids, Iowa

For more data circle 570 on Postpaid Card



MULTI-SWITCH INDICATOR

A multi-switch indicator is announced by Wheelco Instruments Division, Barber-Colman Co., 114 Loomis St., Rockford, Ill. For rapidly checking temperatures at many points, the 9000 Series Multi-Switch Indicator is available with switching details that allow the instrument to be used for as many as 108 stations. Additional stations may be added. The basic instrument is a completely self-contained, null-balance unit and requires only the external sensing devices. The selector switches are three position, spring return type with DPDT action.

The Wheelco 9000 Multi-Switch Indicator uses an 11 inch scale, either single or dual range. Balance speeds are fast, with a choice of 2, 4 or 15 seconds. Reference junction compensation is entirely automatic. Sensitivity is 5 microvolts for scale spans of 5 millivolts. For more data circle 131 on Postpaid Card



Wheelco 9000 Multi-Switch Indicator

GEAR REDUCER COMBINATION

A combined gear reducer and gear-shift drive unit, giving 4 or 8 speeds on the output shaft of the gear reducer, is announced by The Lima Electric Motor Co., Inc., Dept. 144, Lima, Ohio. This line includes double and triple gear reduction units. Motor capacities are rated from 1 to 10 h.p. The Lima Gear Reducer Combination is designed specifically for those appli-

*Now...a new principle ...
a new approach to rapid*

DEBURRING and CHAMFERING
of inside and outside diameters

NOBUROD and NOBURSINK
High Production Partners!

NOBUROD

NOBURSINK

DEBURRING

CHAMFERING

Companion tools — NOBURSINK for openly accessible hole faces and NOBUROD for outer ends of rods, tubes and bosses — provide greatly improved work quality, faster and easier than ever before. Both have low torque design permitting rapid, off-hand workpiece handling without chatter — even on large diameters. Unique design allows regrounding without special tools.

Eliminate makeshift and less efficient tools

Both NOBURSINK and NOBUROD tools work equally well on all metals. Cutting chips are freely expelled from the work area. Each tool accommodates a wide range of work size — and are furnished 90° included angle (produces 45° chamfer).

WRITE for FULL DETAILS TODAY!!

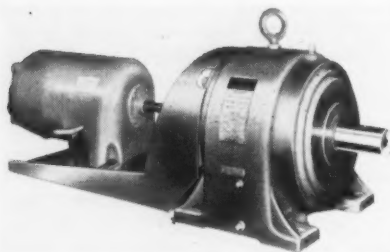


NOBUR MANUFACTURING CO.

6860 Farndale Ave., No. Hollywood, California

For more data circle 571 on Postpaid Card

new shop equipment . . .



Lima Gear Reducer and Gearshift Drive Unit

cations where more than one speed on the output shaft of the gear reducer is desirable.

By moving the shift lever on the gearshift drive into one of four positions, four different output shaft r.p.m.'s are obtainable on the gear reducer.

By using a two speed motor in the gearshift drive, eight different speeds

are obtained on the gear reducer output shaft.

Standard electrical characteristics of the gear reducer combination are: constant torque, 3 or 2 phase, 60 cycle, 208, 220/440 or 550 volts.

For more data circle 132 on Postpaid Card

★ modern machine shop ★

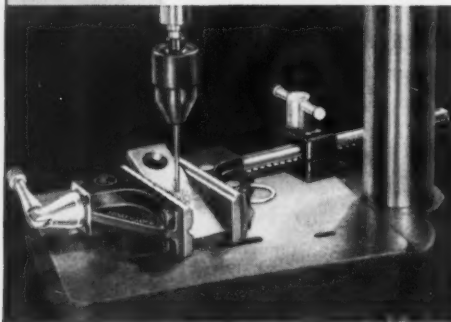
NUMBERING MACHINE

A combination marking and numbering machine to meet REA requirements of consecutive footage marking and numbering on trench wire or cable is announced by The Acromark Co., 9 Morrell St., Elizabeth, N. J. It is the Acromark Automatic Footage Imprinting Machine and consists of two separate units (1) to provide the marking of consecutive numbers and trademark or code marking (2) to provide controlled drive and measuring mechanism.

The numbering and marking head consists of a rotating member on

Speed production . . . cut costs with

INSTANT CHANGE



AUTOMATIC KEYLESS CHUCK

Lets you change tools in *seconds* without stopping the spindle. One chuck does the work of several spindles, won't chew up tool shanks. The greater the torque, the tighter the grip.

DRILL PRESS VISE

Floats and locks *instantly*, positively, in any position on table. Holds work safely for accurate drilling and tapping. Two models: 9" and 12" capacities.

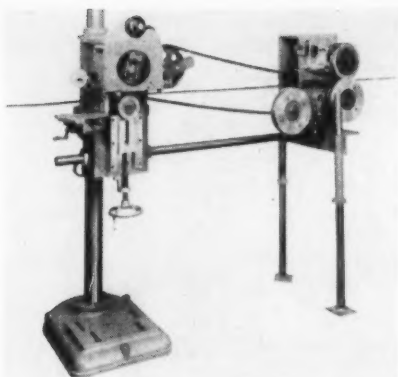
Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N. J.



WAHLSTROM®
AUTOMATIC CHUCKS

FLOAT-LOCK®
SAFETY VISES

For more data circle 572 on Postpaid Card



Automatic Footage Numbering Machine

which has been mounted a barrel type automatic numbering head and an interchangeable die holder. The numbering head advances consecutively and numbers every two feet. The die holder is located 180 degrees from the numbering head in the rotating member and both the numbering and marking members are heated by means of a radiant heater with three step heat control, from a 120 volt power source with about 800 watts capacity. When used on warm or semi-soft jacket, no heat is required.

Characters are $\frac{1}{8}$ inch size and numbering head has to be reset every 99,998 feet. Cable sizes of $\frac{1}{8}$ to 3 inch diameter are marked at speeds of about 300 f.p.m. Machine is adjustable for about 5 feet and swings away from cable when not in use.

For more data circle 133 on Postpaid Card

★ modern machine shop ★

JIG GRINDER

Finer tolerances in the finish-grinding of tools for the missile era are claimed for the No. 3 Jig Grinder, produced by Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn. The No. 3 offers a greater range and larger table than the No.

March, 1959

Another

VICTOR VALUE

**Top Quality
Lowest Prices**

Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in $7/16$ " diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
$\frac{1}{4}$	\$ 6.00	\$ 2.85
$\frac{1}{2}$	12.00	5.00
$\frac{3}{4}$	21.00	7.50
1	30.00	10.25
$1\frac{1}{2}$	54.00	15.00
2	75.00	20.00
$2\frac{1}{2}$	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate
Shipment From Stock!

VICTOR

MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment
Dept. B, 251 Centre St.

Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 573 on Postpaid Card
modern machine shop 269

"ENGINEERED" PRODUCTION MARKING EQUIPMENT

ACROMARKER NAME-PLATE STAMPING MACHINES

40 Characters all interchangeable. Standard sizes range from $\frac{1}{16}$ " to $\frac{1}{2}$ ". Write for Color Folder.

No. 1F

No. 1

PRECISION MACHINES
and ALL EQUIPMENT including
DIES, FIXTURES, CONTROLS, etc.

ACROMARK MARKING MACHINES are of more than 300 different kinds — each one developed for its specific field. STOCK models are the ones most widely used and adapted — but you'll get the correct machine for the job if you buy ACROMARK.

Write today for 1959 General Catalog, fully indexed, covering over 500 marking machines and tools, all originated and patented, copyrighted or registered at U. S. Pat. Off. by ACROMARK. Send sketch or details of your marking need for Engineer's recommendation — without obligation.

REG. U. S.
PAT. OFF.

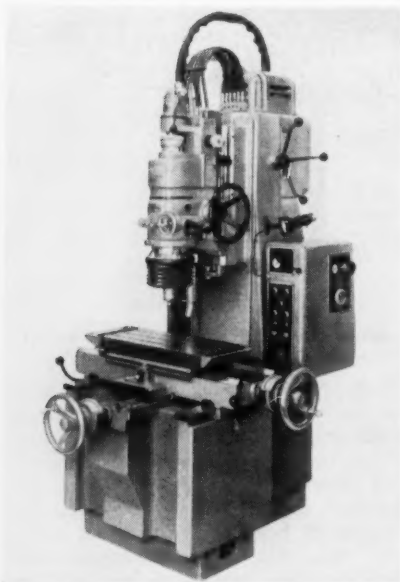
ACROMARK
Company

9 Morrell St., Elizabeth 4, N. J.

"The Original Marking Specialists"

For more data circle 574 on Postpaid Card
270 modern machine shop

new shop equipment . . .



Moore Model No. 3 Precision Jig Grinder

2—11 by 24 by 18 inches in height. It will grind, with split-tenth accuracy, straight or tapered holes and regular or irregular contours to size and location after hardening. It also provides this same efficiency for slot-grinding and chop-grinding operations. Spindle

IMMEDIATE DELIVERY!



Cadmium plated, large selection of styles and sizes. Specials on request. Send for FREE catalog.

MACHINE PRODUCTS Corporation

8771 E. MICHIGAN ROAD - DETROIT 32, MICHIGAN

For more data circle 575 on Postpaid Card

March, 1959

speeds are infinite—40 to 250 r.p.m. This advance is made possible by closer locational tolerances built into the machine.

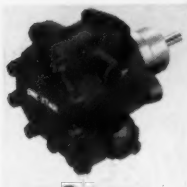
Features include: hardened, ground and hand-lapped steel ways, which eliminate gibs and overhang; infinite spindle speeds, permitting faster strokes for chop-grinding; a large table work-surface; more accessible cross-clamping; micro setting of the vernier dial; and quick setting precision lead screws—which simplify the finish-grinding process. The No. 3 Jig Grinder conforms to J.I.C. standards.

For more data circle 134 on Postpaid Card

★ m m s ★

PUMPS FOR LUBRICATING OILS

A line of gear type pumps, designed to handle lubricating or hydraulic oils at pressures from 20 to 300 p.s.i. and speeds of 1,200-1,800 r.p.m., is announced by Sundstrand Hydraulic Division, Sundstrand Machine Tool



Sundstrand Q7 Pump

Co., 2210 Harrison Ave., Rockford, Ill. Four capacities of pumps are available in the Sundstrand Q7 Series for either left or right hand shaft rotation.

Capacity ranges from 38 to 41 g.p.h. at 1,200 r.p.m., and from 57 to 62 g.p.h. at 1,800 r.p.m. The latter is maximum shaft speed for pumps in the series.

Rota-Roll design is used for the pumping member. This design permits the smaller inner roller, keyed to the

You can't beat Sanding with a

MITY-MIDGET

LIGHTWEIGHT, FAST, DEPENDABLE

Weighing only 4 pounds . . . yet so powerful you can't stall it by standing on it . . . this Air Driven, Orbital Action Sander gives a perfect finish, quickly and easily.



See how "Mity-Midget" can save you time and money. Write for a complete catalog today.

NATIONAL-DETROIT, INC., ROCKFORD, ILLINOIS

For more data circle 576 on Postpaid Card

COLD EXTRUSION HOBBING!

*Here At
Last!*

Intricate Shaped
Cavities are
Produced by
Cold Extrusion to
Precision Accu-
racy...

Cavities that
would be totally
impractical to machine are now produced
in a single operation and in any quantity.
Technique applied to copper, aluminum and
hobbing steel.
Lower cost—closer tolerances.



Send drawings of your designs for quotation to:

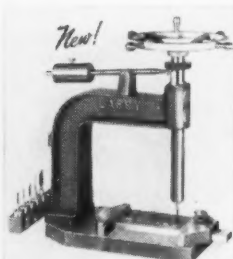
ANTON MACHINE WORKS

1225 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 577 on Postpaid Card

new shop equipment . . .

shaft, to drive the outer member at speeds 25 percent below motor speed, thus assuring quiet operation and long pump life. In addition, the special tooth form of the pumping member virtually eliminates friction, provides positive pumping action and reduces noise due to cavitation at inlet port. For more data circle 135 on Postpaid Card



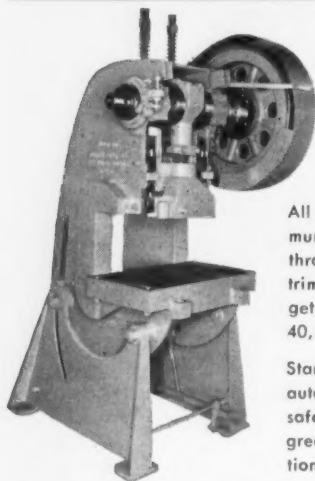
LASSY

Supersensitive Hand Tapper

New exclusive features and top quality make Lassy Tappers outstandingly the finest available.

Write for New illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn.
For more data circle 578 on Postpaid Card



NEW...40 Ton Press-Rite Press with all steel frame takes larger die sets.

All steel frame is heavily reinforced at all vital points for maximum rigidity. Generous ram area, large bed area and depth of throat allows use of larger die sets. Many jobs, such as die cast trimming, electronic work, etc., usually put on larger presses to get necessary die space can now be done on a PRESS-RITE No. 40, 40 Ton O.B.I. Press.

Standard equipment includes 3" stroke, patented PRESS-RITE automatic brake, 4 point sliding key clutch and single stroke safety mechanism. Optional features: longer or shorter stroke, greater shut height, back geared, PRESS-RITE Airflex Air Friction Clutch and others.

PRESS-RITE Division of

Sales Service Mfg. Co.

For complete information and specs on the NEW 40 TON PRESS-RITE PRESS see your PRESS-RITE Dealer or write for new #40 Bulletin.

2361 University Avenue

St. Paul 14C, Minnesota

For more data circle 579 on Postpaid Card

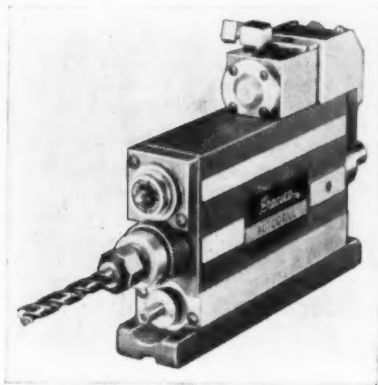
AUTOMATIC DRILL UNIT

Autodrill, a very small air-hydraulic automatic drill unit is announced by Precise Products Corp., Racine, Wis. Autodrill is an electrically actuated drill unit with fully automatic control and complete control of feed and stroke.

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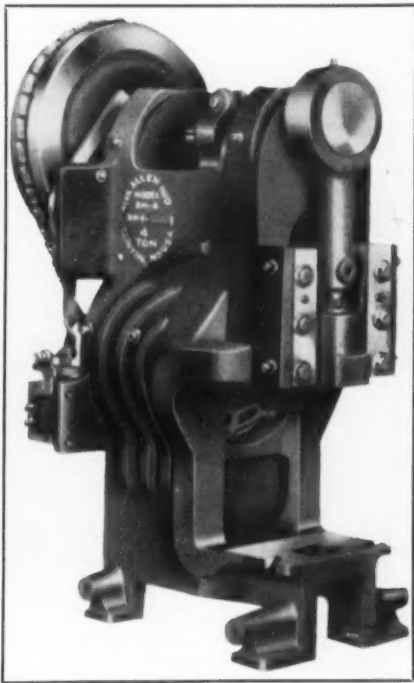
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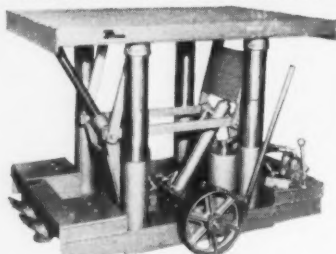
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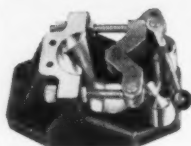
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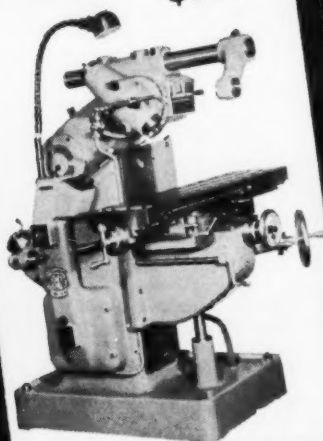
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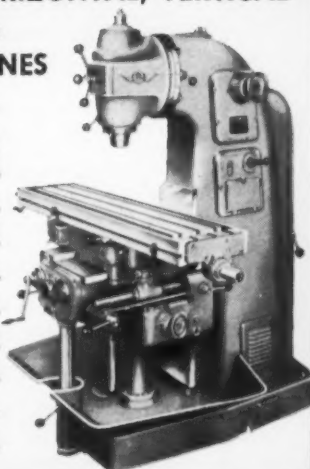
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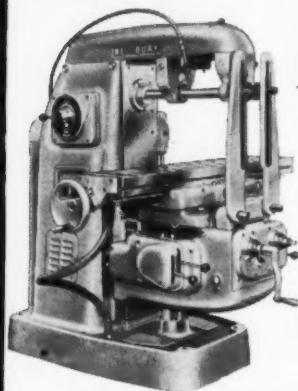
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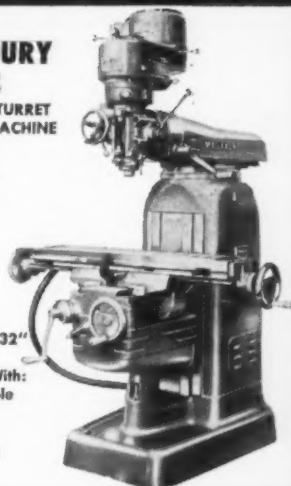
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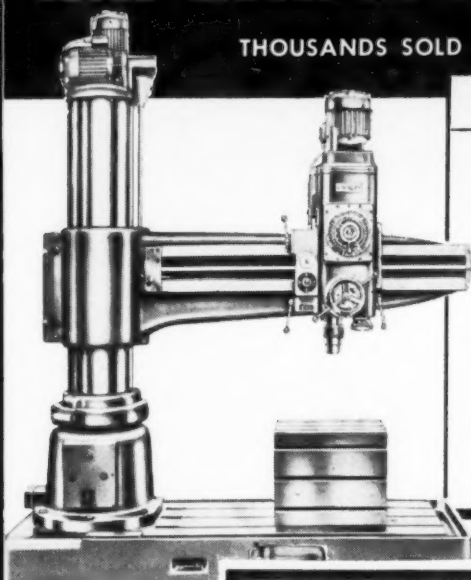
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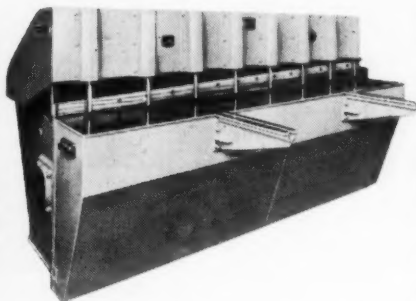
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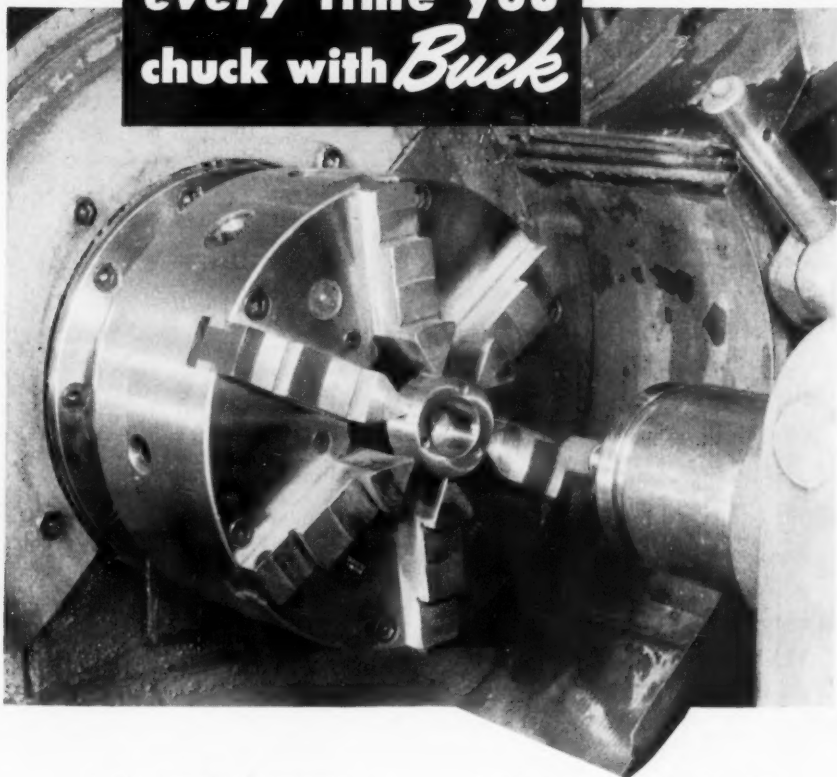
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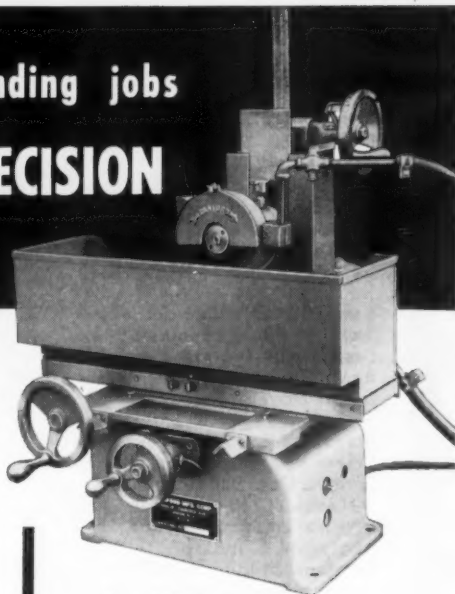
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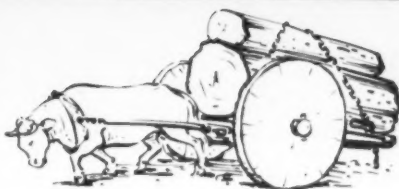
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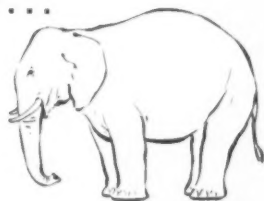
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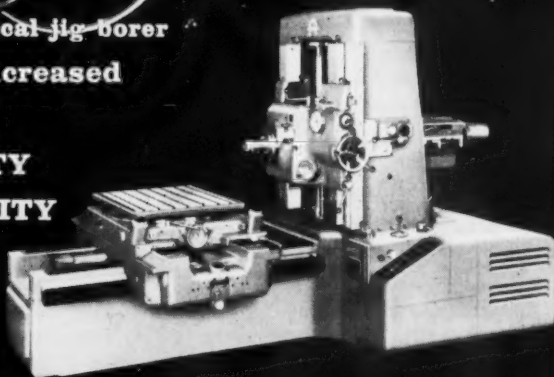
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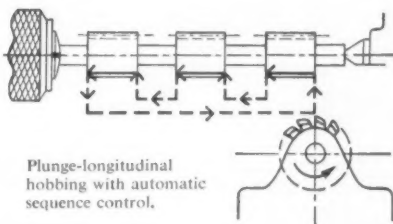
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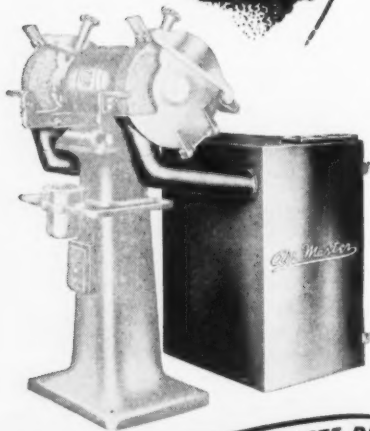
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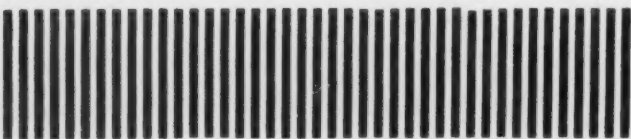
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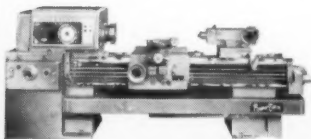
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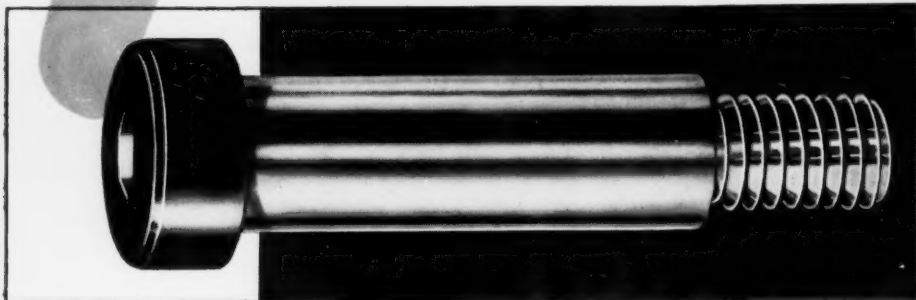


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